PAPER TRADE JOURNAL

Reg. U. S. Pat. Off.

PAPER

SIXTY-FIFTH YEAR

PAPER

Established Feb. 17, 1899
Consolidated Nov. 16, 1899
with PAPER TRADE JOURNAL.

Vol. CIV, No. 12 Thursday, March 25, 1937

Established Sept. 21, 1910
Consolidated Feb. 19, 1925
with PAPER TRADE JOURNAL.

I. P. Announces 1938 Newsprint Base Price $50

Advanced Quotation Will Apply to First Six Months of New Year for Delivery At New York, Chicago, and Other Atlantic and Gulf Coast Ports — Company Hopes That Domestic Market Will Be Established At This Level.

R. J. Cullen, president of International Paper Company, states that the company is announcing to its customers a $50 base price for newsprint for the first six months of 1938, for delivery at New York, Chicago, and other Atlantic and Gulf ports.

Although some foreign markets are already bidding higher, the company hopes the domestic market will be stabilized at this level. The present base price applying throughout 1937 is $42.50. Demand is said to be running more than 10 per cent ahead of last year.

New Southern Kraft Mills

Mr. Cullen also announces that Southern Kraft Corporation, one of the company's principal subsidiaries, has placed an order with the Beloit Iron Works of Beloit, Wis., for two specially designed, high speed, wide Fourdrinier machines to be located at a new mill to be built in the South having a capacity of 220,000 tons of kraft board a year. It is expected that this new mill will be in operation before the middle of 1938.

Mr. Cullen also announced that Southern Kraft Corporation's No. 7 mill, now under construction at Georgetown, South Carolina, will be in full operation by October, 1937, and producing at the rate of over 200,000 tons of kraft board a year.

Huge Total Production

This increase in capacity is in line with International's policy of increasing production to meet increased demand, and will bring the total kraft paper and board production of Southern Kraft Corporation up to 1,000,000 tons a year.

C. Vining Discusses I. P. Move

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 22, 1937.—Quite a flurry was caused in Montreal by the news from New York that the International Paper Company had announced a basic price of $50 per ton for newsprint during the first six months of 1938. Charles Vining, president of the Newsprint Association of Canada, commenting on the announcement, said:

"One important reason for the earliness of the announcement is that it will probably serve to give manufacturers time in which to make definite plans for preparation of machines now shut down, so that additional production may be available when needed to help avoid shortage of supply and wild spot market conditions. The announcement should contribute to stability in this way," he added.

"Consolidated Paper's price will not be less than that announced by International," stated L. J. Belnap, president of Consolidated Paper Corporation. Mr. Belnap had no further comment to make, as he preferred to study the matter more carefully before expressing an opinion.

The reaction of the announcement on the stock market was immediate. Trading in newsprint securities was heavy, with prices for stocks advancing to new highs. It is calculated that the increase will add from $25,000,000 to $30,000,000 per annum to the value of Canada's newsprint output.

Another development was news from Quebec that under laws already existing the Quebec government might feel that with the new price in force the way would be clear for putting a tax of ten cents per cord on newsprint (1¼ cords of wood is supposed to produce a ton of newsprint) and in addition a tax on hydro-electric power used in the production of newsprint, the two taxes together to produce around $1,000,000 per annum, which amount is urgently needed for educational purposes and in particular for subsidizing the University of Montreal.

Chicago Paper Merchants Meet

The Chicago Paper Merchants held their monthly meeting recently at the Union League Club and it was well attended.

A slide talk on "How Much Does it Cost Paper Merchants to do Business?" was delivered by Norman V. Ventriss, secretary of the group.

Among those present were two very welcome out of town guests, S. M. Tobey, Tobey Fine Papers, St. Louis; and Charles J. Gregory, Chape Stevens Paper Company, of Detroit, Mich.

The subject of the April meeting will be "Paper Merchants Salesmen."

President Mueller stated that future meetings of Chicago Paper Merchants are being planned to start promptly at 12:15 and to close at 2 o'clock.

Prospective News Shortage Worries Publishers

Canadian Mills Operating At Full Limit of Effective Capacity to Meet Prevailing Demands — Output During First Two Months of Year Exceeded Record For Corresponding Period In 1936 By More Than 25 Per Cent.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., March 22, 1937—That the long-talked-of prospective shortage in newsprint is now being seriously entertained by publishers has become evident from the latest statistics regarding production and consumption. Thus the production of newsprint in Canada in February was 275,532 tons and the shipments 251,256, the difference between production and shipments being interpreted to mean that consumers are ordering ahead so as to avoid a shortage later on. This is in line with the advice which the American Newspaper Publishers Association has been giving for some time past. In the first two months of this year the output of Canadian mills has shown an increase of more than 25 per cent. over the total for the corresponding period last year. The mills here are working to the full limit of their effective capacity, and while there is a belief that they will be able to meet American consumption this year if orders are so placed as to permit full time employment, it is conceded that it will be a close shave.

The same influences that are working to the betterment of the newsprint industry are apparent in respect to book and bond paper manufacture. During the past week all quotations for fine papers were withdrawn with notification of increases all along the line. Printing houses knowing that price increases were inevitable, have for some time been protecting the customers by ordering ahead, and this has resulted in a glut of orders and a sharp increase in production for prospective needs.

Kersey Paper Earnings Higher

The Kersey Paper Company, which has a newsprint mill at Liverpool, N. S., with a capacity of 650,000 lbs. of newsprint per day, reports 1936 net earnings at $824,219 against $746,624 in the previous year, which indicates the best results since 1931 when the company earned $1,093,573. Deduction of fixed charges at $378,224 left a balance of $445,995 which was transferred to depreciation reserve, in accordance with the policy in effect since 1932, when the entire $479,007 profit and loss balance, after adjustments, was transferred to this account. Accordingly, the report shows no earned surplus.

Exports From Saint John

From the port of Saint John, N. B., it is reported that during February there were substantial increases in the export of pulpwood and lumber, while the export of newsprint was nearly tripled, a total of 35,000 tons going through this port for various destinations compared with 12,200 tons in February of last year. Indications are that these increases will be maintained during March.

Canadian Newsprint in China

From Shanghai the Canadian Trade Commissioner, H. A. Scott reports that Canadian newsprint, which was comparatively unknown in China prior to 1930 had succeeded by 1935 in practically dominating the trade, and newsprint in that year constituted the most important single Canadian export to that country. He adds:

"Germany, aided by her exchange compensation scheme, became the leading supplier of newsprint to this market during 1936, whereas Canada was by far the most important exporter to China in the previous year. Unfortunately, the continuation of extremely low c.i.f. prices in German quotations earlier in the year, ranging anywhere from £6 19s. to £7 17s. 6d. per long ton, was discouraging to Canadian mills, particularly in face of more profitable business offering in certain other outlets, and the volume of imports from the Dominion last year were less than half the total in the previous year.

"By October, however, German prices commenced to advance, due in part, according to local reports, to a partial withdrawal of the exchange compensation benefit to German exporters, and with Canadian paper temporarily out of the market because of increasing business developing at more attractive prices elsewhere, newsprint values rose rapidly in Shanghai, and towards the close of the year, with German mills reportedly sold for months ahead, a heavy demand set in for Scandinavian paper, which had hitherto been pretty well eliminated by German competition, and by December c.i.f. values had risen to around £14 per long ton for European paper in reels.

"While Canada's shipments of newsprint to China declined drastically during the past year, taking the long view, the rise in German and other European prices, which began during the closing months of 1936, suggest that Canadian newsprint, which is now so well and favourably known among consumers in this country, will continue to play an important part in the paper trade in China, aided by the relative nearness to market, thus facilitating quicker deliveries as compared with European competitors.

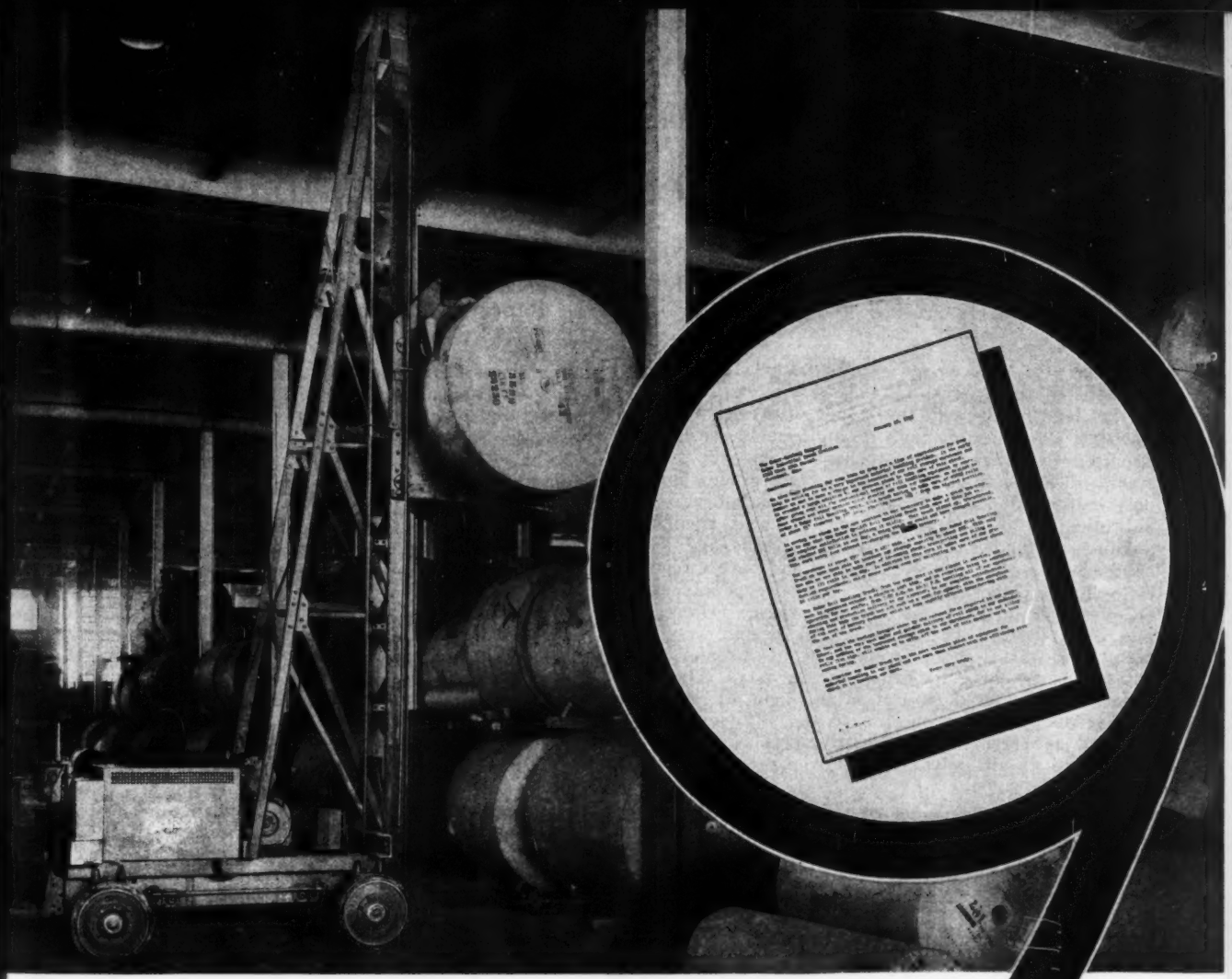
Brazil to Make Cigarette Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 24, 1937—One of Brazil's largest paper mills will shortly start large scale production of cigarette papers, according to reports from Trade Commissioner J. Winsor Ives, at Rio de Janeiro. Machinery for this purpose, which was recently purchased in Germany, is now being installed and should be in full operation around the end of March. It is estimated that approximately two hundred employees will be required to handle this new manufacturing unit.

The above development is of considerable significance by reason of the fact that it marks the first attempt made by the Brazilian paper industry to supply the country's heavy demands for cigarette paper. Some idea of the importance of this demand may be had from official import figures which show that approximately 1,763,680 pounds of cigarette papers are imported annually. Of this amount France supplies in the neighborhood of 70 per cent.

When in operation the new domestic mill will be in a position to supply around fifty tons of cigarette paper monthly or 600,000 kilos per year, which represents 75 percent of the total demand. It is understood that arrangements have already been concluded whereby the company will supply all of the cigarette paper requirements of the Companhia Souza Cruz (Subsidiary of the British American Tobacco Company) Brazil's largest cigarette manufacturers.



January 10, 1935

GENTLEMEN:

We have been planning for some time to drop you a line of appreciation for your help in solving for us a very important material handling problem. In the early summer we had to make a change in the location of our roll storage warehouse and we erected a large addition to our present plant to take care of this stock. After going over all the conventional types of roll handling equipment by overhead cranes and other methods which greatly cut down our headroom, we decided to order a Baker Roll Handling Truck, this truck having to take care of 4000 lb. rolls of about 55" diameter by 77" long, stacking these 15½' from the highest position.

In moving our stock to the new location it was necessary to make a quick transfer, and to say that the Baker Hy-Lift Roll Handling Truck took care of this job to our complete satisfaction is putting it mildly. This truck picked up, transferred, and stacked 295 Rolls in one day, a thing which we would not have thought possible, this work being done without re-charging the ——— battery.

Our warehouse is about 230' long x 120' wide, and by using the Baker Roll Handling Truck we have been able to increase our storage capacity by about 20%. With only two men we are able to take care of in-coming stock, transporting and piling as many as 175 rolls in one day. In addition to this work it takes care of our production requirements, which means taking down and delivering to the elevator about 60 rolls per day.

The Baker Roll Handling Truck, from the time that it was placed in service, has been in operation without a minute's lost time, and on occasions being in constant operation for two shifts, from 7:00 A. M. to 10:30 P. M. handling all of our warehouse stacking and production delivery to our elevator, to our complete satisfaction. During this time the truck has not cost us a cent for upkeep, with the exception of the cost of battery recharge which is done nightly without interfering with the use of the truck.

We feel that the savings brought about by the reduced force required in our warehouse, and the very much safer and quicker delivery of roll stock to our machines, to say nothing of the increased storage space in our warehouse, due to our piling rolls five high, will enable us to write off the cost of this machine early this coming Spring.

We consider our Baker Truck to be the most valuable piece of equipment for material handling in our plant and are more than pleased with the efficiency with which it is handling our work.

Yours very truly,

(copy of this letter on request)

This is but one of the many standard and modified-standard Baker trucks designed especially for handling paper in rolls or sheets, in boxes or on skids. A Baker engineer, trained in the analysis of handling problems, will place himself freely at your disposal. There is no obligation. THE BAKER INDUSTRIAL TRUCK DIVISION of The Baker-Raulang Company, 2162 West 25th St., Cleveland, O.

The Most Economical way to handle material is NOT to HANDle it

Baker

Paper Business Well Maintained in Chicago

Demand for Various Grades of Fine Paper Continues Persistent—Price Situation Exhibits Strong Undertone — Request for Kraft Wrapping Paper Fairly Active — Report Conditions In Paper Board Remain Favorable.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., March 22, 1937 — The Chicago paper market held firmly with the higher prices set during the last sixty days meeting with no appreciable consumer resistance. Fine papers seem to have taken over the leadership of the local market. Most bond grades have not only held their improved price position but also given indication of an underlying tone which is significantly pointing to further upward trends. Bonds and ledgers experienced a good demand. Books and covers remained little changed over last week. Specialty papers carried on effectively in the face of higher prices registered during recent weeks. In the kraft and ground wood markets there was a slight leveling off of demand though not sufficiently to be important in any way. The procedure was considered natural in the light of recent advancements and expansion. Board market conditions were reported as "favorable." Waste papers were improved in demand as virtually all slack was reported as being taken up.

Waste Material Dealers Converse

The National Association of Waste Material Dealers, Inc., closed one of its most successful annual sessions on March 17 with the three day meeting at the Hotel Sherman having proven of use in coordinating plans for future proper development of the waste market. The association elected Joseph Schapiro, of Baltimore, as president. Included among the directors were several Chicagoans including the following: George Birkenstein, George Birkenstein Corporation, Chicago; Edward B. Friedlander, Loewenthal Company, Chicago; and J. V. Spachner, Chicago Mill Paper Stock Company.

In accepting his position as president of the Waste Material Dealers, Inc., Mr. Schapiro pointed out the extent of the present business revival and hoped that "many in our industry will realize that membership in this organization is not to be considered a luxury but a duty to themselves and the trade as a whole." Mr. Schapiro also stated that much of the difficulty encountered by waste material dealers during the "dark days" might have been prevented if the industry had been properly "association minded." In addition to praising the staff of the association, headed by C. M. Hoskins, Mr. Schapiro also predicted that "these changing times, bringing more regulation of industry, will require a strongly united association."

News of the Industry

A new Power Show for the mid-west, the Chicago Exposition of Power and Mechanical Engineering, has been announced for the new International Amphitheatre on October 4-9. The Chicago exposition will be conducted with the viewpoint and manner of the National Power Shows, will be under the same management, and is expected to attract hundreds of exhibitors and guests from those concerns which supply the paper making industry. Leading exhibitors have already signified their intention of being on hand for the Fall event.

The Rotary Club of Chicago is planning its Fourth Annual Business Exposition, which is to be held at the Hotel Sherman from April 27 to 30. The panorama of business exhibits will occupy about 40,000 square feet of floor space and is expected to attract more than 25,000 guests and prospective customers. Included in the many exhibits will be those of local members identified with the paper industry and allied industries who have, in the past three shows, taken an important part in the three day event.

A clever play on the word "brands" as applied to both paper and the branding of cattle, is utilized by the Swigart Paper Company in its recent advertisement to the trade of "The World's Greatest Round-Up of Strathmore Bonds." In the direct mail piece Swigart makes special mention of Highway Bond, called "Strathmore's contribution and ours to the man who demands character in his letterhead at a moderate price." Ten additional lines of bonds, parchments, deeds and Multicopy Bond are also mentioned in the folder.

Chicago is all set for the National Business Show which is to be held at the Stevens Hotel, March 22 to 27. Due to the fact that no business show of the sort has been held in Chicago since 1931, the attendance is expected to be unusually heavy. "America's Efficiency Exposition" is expected to attract the regular exhibitors from the paper and paper supply field as well as some newcomers who, during the past few years, have added lines or perfected lines for the specific purpose of supplying the advertising, direct mail and general business fields.

Government Paper Bids and Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 24, 1937—The Government Printing Office has received the following bids for 100,000 pounds of supercalendered book paper; Dobler & Mudge, 5.6 cents per pound; Whitaker Paper Company, 5.34 cents; R. P. Andrews Paper Company, 5.34 cents; Barton, Duer & Koch Paper Company, 5.82 cents; Stanford Paper Company, 5.34 cents; Paper Corporation of U. S., 5.34 cents; Reese & Reese, Inc., 5.05 cents, and Cauthorne Paper Company, 5.05 cents.

Dudley S. Smith has been awarded the contract for furnishing 500 pounds of vegetable parchment in 48" rolls at 28 cents per pound, bids for which were received on March 1.

The following bids have been received for 440,000 pounds of newsprint paper; National Pulp and Paper Company, 2.25 cents; and Whitaker Paper Company, 2.3 cents.

For 36,000 pounds (360,000 sheets) of antique book paper; J. W. Butler Paper Corporation, 5.41 cents; John F. Post, Inc., 5.67 cents; Cauthorne Paper Company, 5.41 cents; Reese & Reese, Inc., 5.41 cents and 5.26 cents; Whitaker Paper Company, 5.41 cents; Mathers-Lamm Paper Company, 5.399 cents; Walker-Goulard-Plehn Company, 5.9 cents; R. P. Andrews Paper Company, 5.46 cents; Barton, Duer & Koch Paper Company, 5.67 cents; Fitchburg Paper Company, 5.91 cents; Stanford Paper Company, 5.41 cents; Paper Corporation of U. S., 5.85 cents; J. R. Howarth Paper Company, 5.41 cents and 5.55 cents.

Pulpwood Expansion on Crown Lands of Ontario

From 864 Cords Harvested In 1891 Output Reached 1,051,631 Cords in 1930 — With Passage of Time Manufacturing Clause Was Incorporated for Protection of Industry and Labor—Available Stand Placed at 200,000,000 Cords

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., March 22, 1937 — The first cutting of pulpwood on the Crown lands of Ontario was in 1891 when 864 cords were harvested and the first pulp manufacturing industry in the province made its initial appearance in 1894 when the Sault Ste. Marie Pulp Company started production at Sault Ste. Marie, states the Hon. Peter Heenan, Minister of Lands and Forests for Ontario. In 1935, the cut in the province was 611,000 cords of pulpwood and the largest cut in any one year was in 1930 when the pulpwood output reached 1,051,631 cords. Up to 1900, the export of pulpwood cut on Crown Lands was not prohibited, but with the passing of time it became apparent that, for the protection of industry and labor, it should be stopped, as a result of which the manufacturing clause was incorporated in the Crown Timber Act. Since that time in pursuance of statutory amendments, limited quantities have been exported under special authority for such purposes as experimentation, to provide labor or avoid wastage. Mr. Heenan says that, with good prices now prevailing in the United States for pulpwood and with the Ontario mills unable to consume the annual increment, it was natural that consideration be given to permitting the temporary export of wood to save wastage of mature wood and to provide employment. Necessary restrictions were consequently placed to ensure that wood exported would not be used for the production of newsprint which would compete with or affect the market of Ontario mills.

First to Produce Newsprint on Large Scale

The Sturgeon Falls Pulp Company was the first to produce newsprint in Ontario by present day large scale methods although paper mills existed in Ontario as far back as 1841. The first machine installed at Sturgeon Falls in 1903 had a capacity of about 40 tons a day. The total production of newsprint in Ontario last year was 901,024 tons while the rated capacity of all the newsprint plants in the province is 1,064,000.

Mr. Heenan adds that the total available stand of spruce and balsam pulpwood in Ontario is placed at 200 million cords and he does not think that any one will seriously consider that, on the whole, Ontario has over utilized the pulpwood resources of the province. The Minister of Lands and Forests believes that most people will realize that there is room for further development of the industry, based on the pulpwood resources, to the point where the present annual consumption of pulpwood is just about doubled. The total capacity of the Ontario mills is far below the raw material accruals in spite of the occasional ravages of forest fires, with the result that there is more accessible wood available than can be required by the present set-up even though much of it is more remote than was the case when the pulp and paper industry was younger in the province.

Pulpwood Sale Measure

A bill has been introduced in the Ontario Legislature respecting the sale of pulpwood by settlers. Its aim is to protect bona-fide settlers of the province from unjust and unfair prices for the sale of their pulpwood. In many instances settlers although owning and controlling the wood they cut and sell, are so subject to the whim of buyers and middlemen that inadequate prices are received and unsatisfactory measurement obtained. Because of inability on the part of settlers, due to diversified circumstances, to provide ready means of collective bargaining, it is deemed advisable to provide machinery to investigate their plight in marketing their pulpwood and to establish prices that will assure them a fair return on their holdings and the labor involved in harvesting them. The bill provides that the Lieutenant-Governor-in-Council may, upon the recommendation of the Minister of Lands and Forests, make regulations to govern the sale and supply to any company by any settler, fix the kinds and quantities of pulpwood which may be purchased by any company within any stated period and also fix the prices to be paid by any company to any settler for pulpwood, etc. Every settler violating any provisions of the act shall upon being found guilty be liable to a fine of not less than $25, or more than $100. Any company violating the provisions may be fined not less than $500 or more than $1,000.

B. C. Earnings Up

The annual statement of the British Columbia Pulp and Paper Company, Vancouver, B. C., of which Lawrence Killam is president, is an encouraging one in that a net profit was shown of $15,213 against a deficit of $256,738 in the previous year. Operating profits and other income advanced from $307,854 in 1935 to $619,333 last year. Bond interest absorbed $319,717, depreciation $238,000 and income tax $12,000. The deficit carried forward was reduced to $1,073,163 from $1,088,377. Current assets of $1,048,812 exceeded current liabilities of $253,942 for a net working capital of $794,870, a decrease of $35,312 from December 31st, 1935. In his remarks to the shareholders, President Killam said that the company would proceed with further changes in the type of product manufactured to widen the available markets. He announced that $118,000 of the six per cent, first mortgage, gold bonds have been retired through the sinking fund.

Fire broke out recently in the plant of Gummed Papers, Limited, Brampton, Ont., in the building paper department which set the sprinkling system in operation with the result that damage was done to some of the stock. The firm is very busy at the present time and the output in the various lines during the past month was the largest which the company, of which W. J. Hood is president, has enjoyed for several years.

C. B. Davis, for some years manager of the Woods Department of the Abitibi Power and Paper Co. Ltd., Iroquois Falls, Ont., and W. E. Wilson, control staff of the same firm, are being removed to the head office in Toronto, where they will assume new duties. The appointments are promotions, and many friends are congratulating Messrs. Davis and Wilson.

A large addition will be erected to the plant of the Guelph Paper Box Company, Ltd., Guelph, Ont. This structure will be two stories high and in dimensions 47 x 63 feet.

Kimberly-Clark Workers Arrange Safety Contest

All Departments of Kimberly, Wis., Paper Mill to Participate in Competition Beginning April 1 — Meeting Will Be Held In Clubhouse Early In May When Prizes Will Be Awarded to Section With Perfect Record.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., March 22, 1937 — Beginning April 1, employees of the Kimberly-Clark Corporation mill at Kimberly, Wis., will begin a new safety contest resembling a "bank night" plan.

All departments will participate, and at the end of each two weeks a general safety meeting will be held at which a prize will be given some employee who has not been disqualified by being in any kind of an accident, or who has not violated the safety rules. A speaker will give a short talk and summarize safety activities.

An all-day safety conference will be held at the mill clubhouse early in May at which a prize will be given the department having a perfect safety record.

This plan will be followed for several months, in addition to the routine safety work carried on from day to day at the mill.

In January, the employees completed a six months' safety contest in which the departments were organized as eight teams of the "American and National Leagues." Two overtime periods were necessary to decide ties.

Tolls Levied by Flambeau Approved

Tolls levied by the Flambeau Improvement Company totalling $102,419 have been approved by the Wisconsin Public Service Commission. Included in the assessments are: Flambeau Paper Company, Park Falls, $11,170; Cornell Wood Products Company, $1,289; Eau Claire Dells Improvement Company, $12,452; Northern States Power Company, $65,940, and Lake Superior District Power Company, $11,568. The tolls cover stream control of the Chippewa and Flambeau Rivers.

A hearing will be held at Hurley, Wis., April 10 by the commission on the application of the Lake Superior District Power Company to build a dam across the Montreal River at a cost of $130,000.

Paper Mill Unions Approve A. F. of L.

Paper mill unions in Wisconsin will retain their affiliation with the American Federation of Labor, and will not join with John L. Lewis's Committee for Industrial Organization, according to a decision reached at a meeting at Chicago last week. Raymond Richards, of Wisconsin Rapids, Wis., vice-president of the Pulp, Sulphite and Paper Mills Workers, announced that the twelve to fifteen Wisconsin locals represented at the conference were "overwhelmingly in favor" of continued A. F. of L. allegiance.

The union went on record demanding an increase of 15 cents an hour in wages of members in the United States and Canada. Unskilled workers now receive between 26 and 52½ cents an hour, and skilled workers between 40 cents and $1.15. Numerous wage adjustments already have been made in Wisconsin mills.

Tomahawk Grinder Room Destroyed

Fire destroyed the grinder room of the defunct Tomahawk Pulp and Paper Company, Tomahawk, Wis., on the night of March 8. The origin of the blaze was undetermined.

The mill property was bought recently by the Wisconsin Public Service Corporation, which is utilizing the power dam and spending approximately $500,000 for a new power plant. The machinery was being dismantled, and most of it had been removed from the grinder room. The building was about to be razed. It took about ten hours to subdue the fire, which raged in temperature near the zero-mark.

News of the Industry

Reinhold A. Vogt, technical executive of the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., has returned from a five months stay in England, where he supervised installation of the Consolidated's patented coating process in several English mills. The process coats the paper right on the paper machine through a unit of special equipment which applies and dries it. Several English mills have leased the patent rights. Mr. Vogt sailed for New York aboard the *Queen Mary*.

More than fifty students of the chemistry department of the University of Minnesota at Minneapolis made an inspection tour last week of the Kimberly-Clark Corporation's Wisconsin mills. This trip has been made annually by students for the last five years.

Clifford Doering, 24 years old, was fatally injured last week while working at the Thilmany Pulp and Paper Company, Kaukauna, Wis. A roll of paper weighing 1400 pounds fell on him while he was helping to load a freight car. He was taken to St. Elizabeth hospital at Appleton, Wis., but died a number of hours later. He was unmarried.

Charles Heidenworth, 64 years old, beaterman for the Badger Paper Mills, Inc., Peshtigo, Wis., died last week following a two weeks illness. He had been a resident of Peshtigo most of his lifetime.

Superintendents to Convene

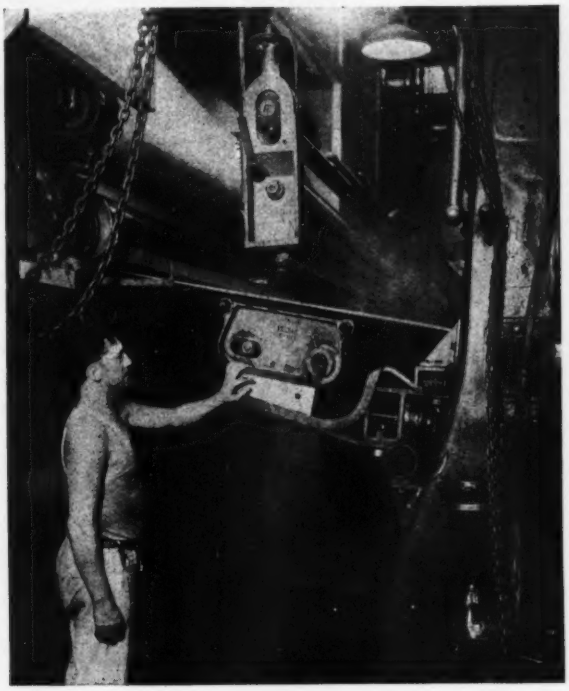
ATLANTIC CITY, N. J., March 22, 1937—Modernization of equipment and plant expansion to meet competition from the South will be one of the major topics of discussion at the 1937 convention of the American Pulp and Paper Mill Superintendents Association—Pennsylvania, New Jersey and Delaware division. The convention is to be held April 30-May 1 at the Ritz-Carlton Hotel, Atlantic City, marking the first time the superintendents have ever met at the seashore.

Harry C. Busser, of the Southern Kraft Corporation, president of the association, promises some interesting papers at the two-day conference. With the smaller and older mills in the area constantly seeking new ideas and methods in order to hold their positions in the industry in the face of the enormous development in kraft papers, coupled with widespread business improvement and the added inducement of Atlantic City's attractions, a record attendance is expected.

New products, newsprint production and plant safety are also expected to come in for much discussion. In addition to the business sessions there will be a banquet, entertainment and dance; group luncheons, and a special ladies' program, including a bridge tournament and an outing on the Steel Pier.

What Is The "MICRO-MIST" ?

It is the latest and best means of redampening paper as it leaves the driers.



What Does It Do?

It atomizes water and mists it onto either or both sides of the sheet.

What Is Its Effect?

It increases the calender finish, prevents darkening of the sheet, adds from 1% to 3% to the safe moisture you are now carrying. It prevents curling and makes the sheet lie flat.

How Quickly Will It Pay For Itself?

Based on increased paper tonnage per ton of pulp, and disregarding greater ease of finishing and increased salability of product—conservatively, in 4 months.

VALLEY
Iron Works Company

Plant: Appleton, Wisconsin
New York Office: 350 Madison Ave.
Canadian Representatives:
Pulp and Paper Mill Accessories, Ltd., Montreal
Canada

You cannot afford to be without a full knowledge of the "Valley Micro-Mist." For further information, write the Valley Iron Works, Appleton, Wisconsin.

Beaters • Jordans • Stock Inlets • Roll Wrapping Machine • Pumps • Deckers
Screw Presses • Laboratory Equipment • Plug Valves • Flat and Rotary Screens
Vortex Beater • Automatic Felt Guide • Hypoid Gear Drive • Voith Kneader • Paper Marking Device

Pennsylvania Paper Mills Well Sold Ahead

Many Manufacturers Are Quoting Prices Prevailing at Time of Shipment and Are Not Making Commitments for Future—John H. Clemson, of the T. W. A., Addresses Members of Paper and Cordage Association, Inc.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., March 22, 1937—It is reported here that mills are very busy, being sold ahead for all of the next quarter. Many are quoting prices prevailing at time of shipment, and are not making any new commitments, reserving the right to reject all orders for new business.

Association Activities

The regular meeting of the Philadelphia Paper and Cordage Association, Inc., was held on Friday last at the Adelphia Hotel with luncheon at 12:30 o'clock. President E. K. Lay presiding, introduced the guest speaker, John H. Clemson, District Manager of the Transcontinental and Western Air Express, Inc., Mr. Clemson took his listeners on an imaginary airplane trip in a super-liner delineating some novel and unusual experiences that he has had in all parts of the country. He stated they are now starting a freight service by air and, no doubt, the time is not far distant when those in the paper industry will be shipping and receiving rush orders of paper by air.

President Lay announced the annual shad dinner will be held on Friday, April 2 at the Meridian Club, Chancellor and Camac streets at 6:30 P. M., and said he hoped for 100 per cent attendance at this dinner.

National Container Sit-Down Strike

Officials of the National Container Corporation, Fifty-first street near Grays Avenue, where the boss is sitting down with the workers, states that injunction proceedings will be filed in the courts to eject the approximately eighty-five employees who began a sit-down strike in the plant on Tuesday last.

The petition was being prepared by David Bortin, counsel for the company, and it is expected he will file it within the next day or two.

Meanwhile, the sit-down strike, in which Frderic R. Mann, president of the firm, also is participating, continued quietly. "I can stay just as long as they can," said President Mann. Mr. Mann was away on a business trip when the strike was called on Tuesday, but the treasurer of the company, A. L. Rosenfeld, immediately joined the strikers in sitting down. When Mr. Mann heard the news he rushed back and joined the sit-down.

"We sleep on cots in the office and either the office workers or my chauffeur brings us in food," Mr. Mann said. "We're really quite comfortable.

Stanley Dever, president of the United Bag Workers and Allied Trades Union, which called the strike, said 118 of the 200 workers in the plant are on strike, but company officials said there were only eighty-five. The local unit, affiliated with the C.I.O., was only one day old when the strike was called Tuesday after demands for a 10 per cent wage increase and a forty-four hour week were turned down, he said.

A conference between the two sets of sit-downers was held yesterday afternoon and Mr. Mann is said to have accepted the wage and hour demands, but refused to sign with the union until the rest of the industry did.

"We tried to reach a truce before they went on strike, and asked for thirty days to classify the departments and arrange wage scales with a flat 10 per cent increase right away," Mr. Mann said, "but some outside agitators got in and started the strike. We cannot see our way clear to recognize affiliation with a union wholly unallied to our industry."

When a group of the girl sit-downers left the plant to get food, the police on guard refused to let them go back. They finally were dragged through windows in the side of the plant. About forty more girls paraded in front of the plant carrying banners.

A representative of the C.I.O. made several attempts to enter the factory, but he was ordered out by Mr. Mann. Later the striking employees gathered about a window and sought to hold a meeting with the C.I.O. representative on the outside, but police chased him away.

Andrew Walls Dead

Andrew Walls, 83, well-known Glenolden resident and father of the Very Rev. Andrew A. Walls, S. M., supervisor of the seminary at St. Mary's Manor, South Langhorne, Pa., died during the week of a heart ailment, following a five months' illness at his home 418 Chester Pike, Glenolden.

Before his retirement about ten years ago from the Scott Paper Company in Chester, Mr. Walls had been associated with that concern for twenty-five years. A native of Ireland, he came to Glenolden sixty-five years ago.

He leaves another son, Edward A. of Jackson Heights, N. Y. and a daughter, Mrs. Mary Chapman of Glenolden.

Paper Industry's Problems Discussed

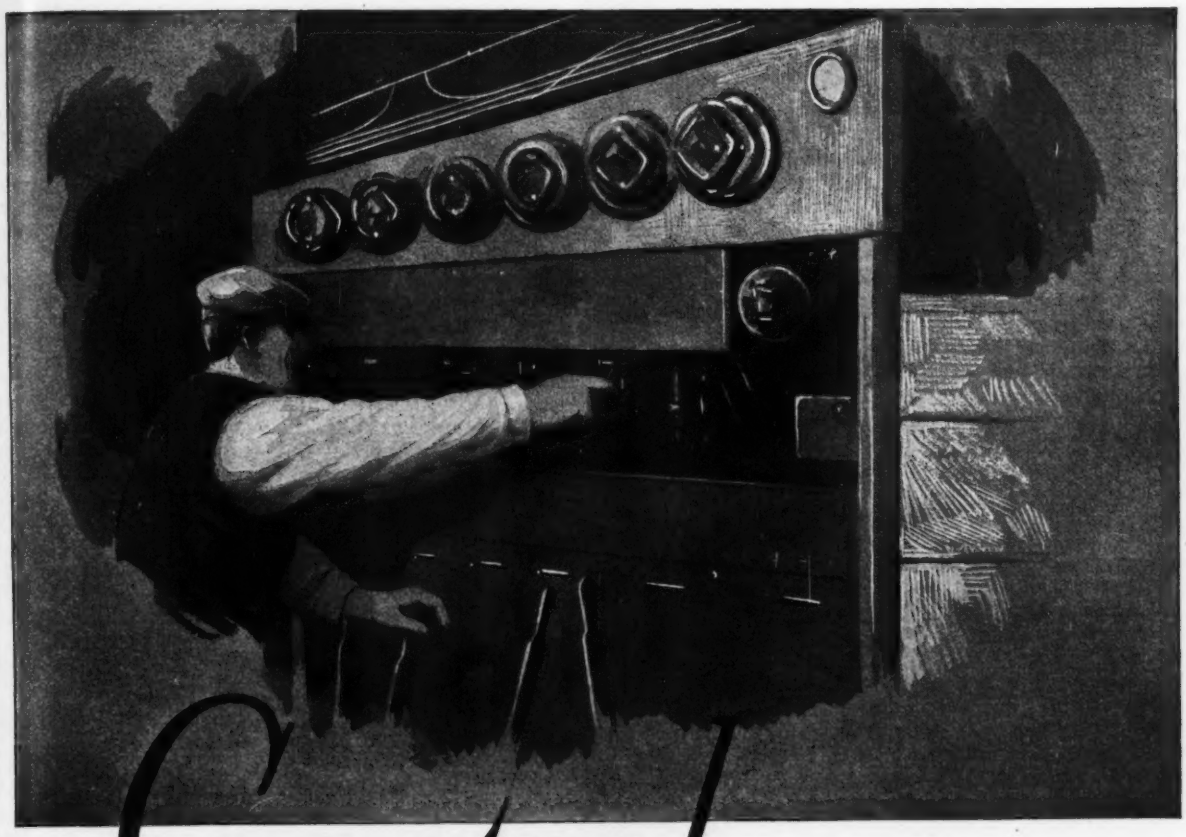
There was an excellent attendance at the regular luncheon and meeting of the Eastern Division of the Salesmen's Association of the Paper Industry, which was held last Monday in the Empire Room of the Hotel Lexington, N. Y.

A. H. Chamberlain, executive-secretary; J. H. Londergan, assistant-secretary in charge of the Fine Paper Division; and O. F. Marquardt, former president of the National Paper Trade Association of the United States, discussed freely the many problems facing the paper merchant and the paper industry at the present time and offered valuable suggestions to remedy prevailing conditions.

Will Use Paper Sacks

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., March 22, 1937—Commencing April 1, 1937, the British Columbia Cement Company, Ltd., Vancouver, B. C., will discontinue the use of jute sacks and will pack all its cement in paper sacks. The firm will thus eliminate the necessity and expense of packing and returning empty jute sacks, and will provide an added benefit to the consumer, with no extra charge for the paper sacks. The usual ten cent refund for all jute sacks returned will be continued by the company up to April 15, 1937.



Control

It's serious business guiding the movements of scores of railroad trains from the dispatcher's tower. Without *control* a railroad system would be unable to function.

The drying of paper likewise cannot be properly accomplished without control . . . such as a Fulton Dryer Drainage system makes possible. On 475 machines, far more installations than can be credited to all other makes combined, the Fulton system is doing its part to produce better paper at faster speeds.

With a Fulton, the temperature of each dryer roll is kept constantly at that point most favorable to efficient drying. But if changes in run necessitate changes in dryer temperature, such can be accomplished quickly and surely.

Dryer section control pays big dividends. Savings on steam costs alone mean quick amortization. But when you also learn that cockle, curl, and broke due to improper drying are reduced to the minimum, the realization must dawn that without the Fulton system for dryer drainage you are passing up something big.

Hundreds of other mill managements have thought so. That's why this proven system has been installed on no less than 475 paper machines. Line up! Send in your inquiry now. Ask for Bulletin No. 40 if drying at pressures of 5 to 50 pounds; Bulletin No. 60 if operating at lower pressures.

THE MIDWEST-FULTON MACHINE COMPANY
Dayton, Ohio

MIDWEST-FULTON

New England TAPPI Discusses Sulphite

The regular monthly meeting of the New England Section of the Technical Association of the Pulp and Paper Industry opened with a dinner at 6:30 p.m., Friday, March 19, with John Calkin, chairman, presiding.

N. L. Nourse, sales manager, Brown Company, Portland, Maine, was the guest speaker, with his subject, "Sulphite Pulp, Its Manufacture and Application."

Mr. Nourse discussed generally the technical developments in the manufacture of various pulps and their application in the paper industry. In recent years the use of pulp for many new paper specialties has brought about the development of new pulps to meet their requirements. Many other new uses for pulp developed in other fields, consuming a considerable tonnage—which in the past was confined principally to the paper industry. The rayon industry in particular has expanded to such a degree that the fulfillment of its pulp requirements is a major factor in the shortage of bleached sulphite throughout the country.

An interesting discussion followed Mr. Nourse's paper.

A drive to increase its membership is being started by the New England Section of TAPPI. Lewis K. Burnett, vice-chairman, has analyzed the membership of the Section, and reports that it has a much larger potential membership than it is now enjoying, and that a considerable number of the paper mills have no representation. Letters will be sent out shortly to these mills explaining the purpose of the Section and the benefits derived from membership in it.

Many of the members of the National Association from this district do not hold membership in the local Section.

An approximate analysis shows that only 30 per cent of the mills in Massachusetts, Connecticut, Vermont and New Hampshire (within 100 miles of Holyoke, Mass.) show representation in the Section, and only 40 per cent of the National Association members in this area are members of the Section.

In view of the above facts, it is desirable that the present members make an effort to help the committee to strengthen the membership of the Section.

Those Present

Following are those who attended the meeting:

Alfred J. DeCouagne, S. Shapiro & Sons, Inc., Holyoke, Mass.; J. Lewis Perkins, Jr., B. F. Perkins & Son, Inc., Holyoke, Mass.; Albert F. Gilmore and F. Massey, Bird & Son, E. Walpole, Mass.; Arthur B. Green, Needham, Mass.; John B. Calkin, Dennison Mfg. Company, Framingham, Mass.; H. T. Barker, Bird & Son, East Walpole, Mass.; F. C. Clark, Skinner & Sherman, Inc., Boston, Mass.; Dorothy Evans, American Tissue Mills, New York City; E. N. Wennberg, Moore & Thompson Paper Company, Bellows, Vt.; T. H. Parkhill and Maurice E. Blew, Strathmore Paper Co., W. Springfield, Mass.; H. A. Otto, American Tissue Mills, South Hadley, Mass.

L. K. Burnett, Robert Gair Company, New London, Conn.; L. N. Smith, American Tissue Mills, South Hadley, Mass.; M. V. Horgan, American Writing Paper Company, Holyoke, Mass.; R. G. Vaeth, Robert Gair Company, New London, Conn.; D. K. Bartlett, West Dudley Paper Company, West Dudley, Mass.; Henry L. Mellen, Deerfield Glassine Company, Monroe Bridge, Mass.; L. A. Thompson, Hercules Powder Company, Holyoke, Mass.; N. L. Nourse, Brown Company, Portland, Maine; W. O. Johnson, Westfield, Mass.

Ralph Carter, Highland Knitting Company, Springfield, Mass.; A. F. Cosby, American Writing Paper Company, Holyoke, Mass.; R. J. Hemphill, General Electric Company, Pittsfield, Mass.; Helen U. Kiely, American Writing Paper Co., Holyoke, Mass.; Paul J. Knight, Bird & Son, E. Walpole, Mass.; Louis F. Loutrel, Jr., Merrimac Chemical Company, Everett, Mass.; J. J. Thomas, Rohm & Haas Company, Philadelphia, Pa.; George W. Munson and R. H. Doughty, Fitchburg Paper Company, Fitchburg, Mass.; J. T. Leecock, American Writing Paper Company, Holyoke, Mass.; P. S. Bolton, Clinton Company, Boston, Mass.

John Dickson, R. T. Vanderbilt Company, New York City; Homer Sinclair, American Tissue Mills, Holyoke, Mass.; George Carroll and Marshall Ross, American Writing Paper Company, Holyoke, Mass.; James Fitzgerald and Charles Backus, Collins Mfg. Company, N. Wilbraham, Mass.; William Anderson, Stevens Paper Company, Westfield, Mass.; S. D. Hellberg and John P. Kennedy, American Writing Paper Company, Holyoke, Mass.; Frank H. Leonard, Marble-Nye Company, Providence, R. I.; Fred W. Schneider, Hampden Color & Chemical Company, Springfield, Mass.; J. E. Doyle, American Writing Paper Company, Holyoke, Mass.; Herman Grasselt, Collins Manufacturing Company, Holyoke, Mass.

Robert W. Pattison, American Writing Paper Co., Holyoke, Mass.; L. R. Frisbie, Westfield River Paper Co., Russell, Mass.; George Spencer, E. D. Jones Company, Pittsfield, Mass.; George A. Thompson, Sr., Whiting Paper Company, Holyoke, Mass.; C. L. Reece, Whiting Paper Company, Holyoke, Mass.; Charles C. Moreau, American Tissue Mills, Holyoke, Mass.; W. P. Richardson, Arthur D. Little, Inc., Cambridge, Mass.; H. W. Richter, George O. Jenkins Co., Bridgewater, Mass.; W. J. Burke, General Dyestuff Corporation, Providence, R. I.

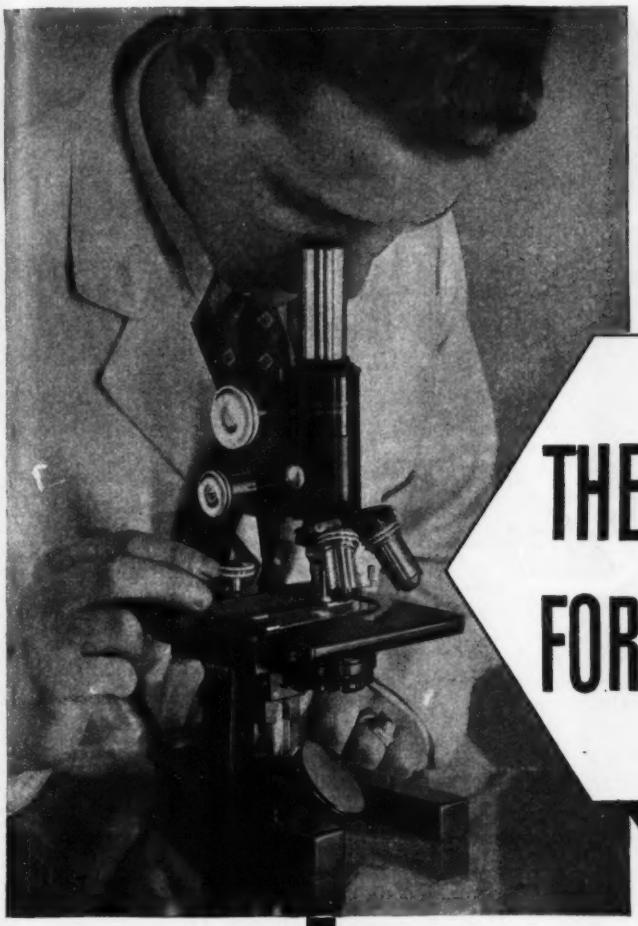
Sanford E. Thompson, The Thompson and Lichtner Company, Boston, Mass.; Vernon Woodside, Mathieson Alkali Works, Inc., New York City; L. A. Kolker, Mathieson Alkali Company, Providence, R. I.; Stephen Stapley, Chemical Paper Company, Holyoke, Mass.; Lena E. Kelley, American Writing Paper Company, Holyoke, Mass.; Fred Lovenberg, George Mann Company, Providence, R. I.; A. L. Perry, Krebs Pigment Company, Boston, Mass.; Gustav Magnus, Francis Gillispie and James O'Connor, American Writing Paper Co., Holyoke, Mass.; Lester Crouse, Penick & Ford, Springfield, Mass.; R. E. Kilty, Staley Company, Springfield, Mass.

New Fairbanks Morse Bulletin

In a new bulletin No. 6165 Fairbanks, Morse & Co. describes its duplex, self-oiling pumps for handling mud and slush, clear water, petroleum products and other liquids.

These sturdy pumps are offered as basic units; for belt drive; and with top-mounted or tandem-mounted motors. They are available with capacities from 23 to 94 gallons per square inch and with pressures up to 475 pounds per square inch.

The bulletin, in a sectional view, points out and describes those construction features that contribute to excellent, dependable performance under severe conditions. The different construction features and materials with which these pumps are available make them adapted to many service demands.



THE STARTING POINT FOR YOUR ANALYSIS

F R E E

B & L have prepared a comprehensive booklet entitled "Use and Care of the Microscope." It contains all of the information necessary for a chemist to have for the proper use of a microscope. Write for your copy.

OTHER B & L MICROSCOPES

Research Microscope
Chemical Microscopes
Polarizing Microscopes
Wide Field Stereoscopic Microscopes
Metallurgical Microscopes

THE paper technologist who uses one of these microscopes for an initial examination will find that his observations will often lead the way to the solution of problems which would be difficult or impossible by any other method.

That is why your laboratory should include the B & L Type H microscope. You will find it exceedingly valuable in identifying, analyzing, counting and measuring paper fibers.

The H Type B & L Laboratory Microscope is available in several models with equipment for a variety of purposes. Catalog D-185 describes the entire line. Write for it. Bausch & Lomb Optical Co., 627 St. Paul Street, Rochester, N. Y.

BAUSCH & LOMB

....WE MAKE OUR OWN GLASS TO INSURE STANDARDIZED PRODUCTION

FOR YOUR GLASSES INSIST ON B & L ORTHOGON LENSES AND B & L FRAMES...

Boston Paper Trade Association Convenes

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., March 22, 1937 — With approximately 135 present the Fifty-First Annual Meeting and Dinner of the Boston Paper Trade Association was held Wednesday evening at the Algonquin Club. A reception preceded the dinner.

President F. Bendel Tracy, who presided, touched on the history of the association, mentioning that President Taft had addressed the organization 25 years ago. The report of the treasurer, T. Charles Casey, which was then made, showed the treasury in good condition, and it was accepted.

In the absence of the secretary, John L. Hobson, on account of illness, the secretary's report was read by Norman Harrower, which showed a membership of approximately two hundred. The report was accepted.

Taps were sounded for those who had died during the year, including Asaph Churchill, George E. Crafts, William F. Whiting and Hammond M. Whitney.

Elected to Regular Membership

The following were elected to regular membership: Ralph B. Case, of Hollingsworth & Whitney Company, Boston; Carl J. Knutson, H. J. Dowd Company, Cambridge, Mass.; Clarence W. Harvey, Munro & Church Company, Boston, and Frederick Lockwood, Knight, Allen & Clark, Inc., Boston; to limited membership, Lee Hulett, The Chemical Paper Manufacturing Company, Holyoke, Mass.

New Officers

Colonel Charles S. Proctor read the report of the nominating committee. All candidates were elected as follows: President, F. Bondel Tracy; first vice-president, Walter J. Raybold; second vice-president, John L. Hobson; treasurer, T. Charles Casey; secretary, John H. Brewer.

Executive committee — Norman Harrower, Charles W. Fields and W. Edwin Porter, Jr.

Membership committee — W. N. Stetson, Jr., chairman, Royden Loring, R. M. Stone, Willard H. Loud and Hubert W. Lockhart.

Arbitration committee, George W. Wheelwright, chairman, Arthur L. Hobson, Irving N. Esleeck, Jesse G. Swift and Harry C. Thayer.

Auditor — William Ross.

His Excellency, Charles F. Hurley, Governor of Massachusetts, was invited as guest of honor, but due to the pressure of other matters was unable to attend. He was represented by Francis W. McKeown, who brought the greetings of the Governor and the sincere regrets that he could not come to the dinner. Mr. McKeown was escorted to the head table by Colonel Proctor, John E. A. Hussey, T. Charles Casey and John E. Roach, appointed by the chair.

The guest speaker, Alton Hall Blackington, a newspaper man, gave an illustrated lecture on "The Romance of News Gathering," highly interesting from beginning to end, including pictures connected with many news stories.

During the dinner there was community singing, led by E. Lindsey Cummings.

Those Who Attended

Those present included the following:

Harold A. Allen, R. W. Allen, George C. Andrew, John A. Andrew, John A. Andrew, Jr., Sumner B. Andrew, Roy F. Arnold, H. C. Barr, Sidney W. Bartlett, Paul M. Beach, Ralph G. Beckett, Arthur Bell, E. D. Bement, Henry F. Bigelow, Alton Hall Blackington, Gorham Bliss, Harold Bostwick, J. H. Brewer, M. H. Broome, Charles J. Brown, William Bruck-Lawser, J. F. Burke, C. A. Burrell, Streeter Bush, Walter G. Butler, Alfred T. Carter, Hubert L. Carter, Winthrop L. Carter, R. B. Case, T. Charles Casey, Howard E. Chase, C. Lloyd Claff, Lewis L. Claflin, Nathan S. Clark, Earl S. Clark, E. Lindsey Cummings, R. L. Day, S. D. DeForest, Charles H. Dodge, J. J. Dwyer, Robert W. Ely, Gordon E. Emerson, C. A. Esty, Arthur F. Fay, Charles W. Fields, H. C. Fowler, Arthur W. Frank, P. B. Fraser, Bruce U. Gardiner, John R. Halkyard, Clifton S. Hall, J. Francis Halloran, Norman Harrower, C. W. Harvey, Frank D. Hatch, Edgar P. Hay, Lee H. Hulett, Ralph Humes, Hartley A. Hurlbert, John E. A. Hussey, John Kelley, Everett E. Ketcham, Carl J. Knutson, Fred B. Korbel, Joseph J. Levis, Herbert A. Lindenberg, Edward H. Little, Hubert W. Lockhart, F. G. Lockwood, Royden Loring, Walter A. Lowe, M. L. Madden, Leon Maglathin, Frederic W. Main, F. W. Mason, F. H. Masselink, William J. McLellan, Arthur W. Middleton, George Moses, Horace A. Moses, John L. Munro, Charles W. Nelson, C. E. Newell, W. W. Newton, Robert Nivison, Robert A. O'Neil, Maurice A. Park, Edward W. Pierce, Richard F. Piper, R. H. Poeckert, Leon M. Poore, W. Edwin Porter, Jr., Walter M. Pratt, Charles S. Proctor, H. S. Proctor, Lennox Ransom, Walter J. Raybold, Ernest S. Reid, C. E. Rice, R. B. Rising, John E. Roach, Herbert W. Robbins, William Ross, William C. Ross, Charles A. Shaw, E. T. Simpson, Albert R. Smith, William S. Smock, Joseph D. Snell, Constant Southworth, Robert M. Stone, Edward J. Sullivan, Edward H. Sussenguth, Jesse G. Swift, Royal P. Teele, Charles W. Townsend, F. Bendel Tracy, William Gardner Very, John W. Vivian, K. H. Ways, Robert H. Welsh, C. Frederic Wellington, James N. Weems, Jr., Ralph White, Ray Wight, John R. Whitney, E. L. Wood, Fred L. Wood, Harry R. Woodward, Franklin Wyman, Leon H. Young and John D. Zink.

An Achievement in Paper Making

Hurlbut Paper Company, South Lee, Mass., has the distinction of being the first paper mill in the United States to export "Mould Made Cover" papers.

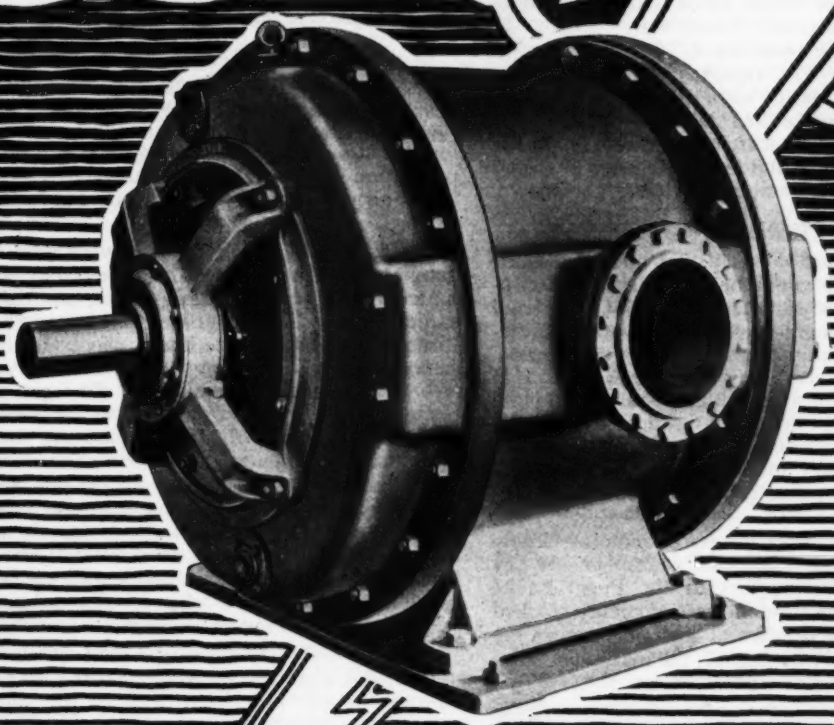
At the annual Paper Convention held at the Waldorf Astoria, New York, Hurlbut Paper Company had a very attractive display of new papers, and their new "Mould Made Cover" was a decided attraction.

One of the leading European importers of paper was so much impressed with the line that he immediately placed a stock order for this new "Mould Made Cover", and will be Hurlbut's distributor for the Continent.

Hand and Mould Made papers have been imported into the United States since early Colonial days, and the fact that an American mill has now produced a Mould Made sheet sufficiently attractive to warrant an outstanding European merchant importing the line, is indeed an accomplishment and speaks highly for Hurlbut's "Mould Made Cover".

This new sheet was most favorably received at the Convention, and many of the leading paper merchants in the country have taken on the agency.

RIGHT TO THE POINT!



ECONOMY

NASH PUMPS

A thousand leading mills have found these pumps the answer to vacuum problems. Simple, efficient, and economical. One moving part, rotating without metallic contact. No pistons, no gears. Ball bearings. Increased vacuum range. These pumps set new standards for performance and economy. Ask for Bulletin No. 236.

THE NASH ENGINEERING COMPANY
SOUTH NORWALK, CONNECTICUT, U. S. A.

Laboratory Studies of Sulphite Waste Liquor*

By H. K. Benson[1]

In view of the difficulties involved in the disposal of the waste liquor of sulphite pulp mills it seemed of pertinent interest to enlarge our fundamental knowledge of the nature and properties of this liquid waste product. In these studies two principal objectives were kept in view. First a more accurate and fuller knowledge of the components which caused an alteration or pollution of the water bodies into which the waste was discharged and second an evaluation of properties or characteristics of the waste for useful service in industry.

The first objective was embodied in a doctorate thesis of A. M. Partansky in the borderland field of chemistry and bacteriology. This study covered a period of nearly three years and sought to answer the simple question of what becomes of sulphite waste liquor when it is discharged into sea water or fresh water and subjected to the natural processes that occur in such water bodies. In a three-year study of the pollution of Oakland Bay, in Puget Sound the writer *(1)* reported that there is no accumulation of organic matter in the Bay and concluded that it was evidently being broken down by the action of micro organisms naturally occurring in the sea water. What these organisms were and the mechanism involved in the destruction of the organic matter were not known.

Influence of Temperature and Dilution

In order that a study of these factors might be made under controlled scientific conditions a financial grant-in-aide was obtained from the National Research Council and a laboratory in the Oceanographic Building of the University of Washington was equipped for such an investigation. The object of this experimental investigation was to study the influence of temperature and dilution of the sulphite waste liquor by sea water on the rate and extent of its decomposition and stabilization under strictly anaerobic conditions of the sea water mud and, if possible, determine the nature of the residual products produced during the fermentation.

Three different temperatures to approximate as closely as possible those of natural conditions were selected: (1) 9 deg. C., the average temperature of the Puget Sound waters; (2) 21 deg. C., the temperature commonly reached by the water retained on beaches at low tide during the hot period of the year; (3) 36 deg. C., the maximum summer temperature of sea mud exposed at low tide.

Four dilutions of sulphite liquor with sea water ranging from 0.38 grams of solids to 7.39 grams were used. Mud was taken at low tide from the Huston oyster beds at Mud Bay, seven miles south of Olympia, Wash., and added to the fermentation vessels at the rate of 4.5 kilograms in 10 liter bottles. In order to properly describe the sulphite liquor it was necessary to devise a more accurate method for the sulphur and such a determination *(2)* was worked out in cooperation with R. N. Pollock, chemist with the Rainier Pulp and Paper Company at Shelton, Wash.

It was found *(3)* that at the end of 310 days fermentation at 36 deg. C. was complete, at 21 deg. C. it had practically ceased but at 9 deg. C. the cultures were still fermenting. Sugars of the liquor were destroyed to the extent of at least 85 per cent but the extent of gasification, amounting to 25 per cent of the carbon input was greater than could be accounted for from the decomposition of sugars alone thus indicating that non sugar components were also subject to bacterial action. From the analysis of the gases evolved by fermentation, it was found that carbon dioxide resulted from the aerobic stage and methane and hydrogen sulphide were reduction products. The oxygen consumed value of the liquor after fermentation had ceased was equal to about 50 per cent of the original. This resultant product was a stable material of a faint odor and after aeration did not cause any change in the oxygen consumed. From other considerations it was found that this bacterially resistant material was subject to biologic decomposition by moulds and organisms similar to those active in the decay of wood.

Effect of Mixed Cultures on Fermentation

In order that the effect of mixed cultures upon fermentation might be studied in greater detail and special attention might be given to the exact nature of changes taking place and the kinds of organic substances remaining unfermented might be ascertained, a second phase of the investigation was undertaken. This study was made possible by a financial grant by a group of Puget Sound sulphite mills.

In this study gallon glass jars were used for fermentation vessels. The mud was collected from twelve different sources which included lakes, rivers, brackish sloughs and garden soils. The bottles were incubated for 340 days at 36 deg. C. The sulphite liquor was neutralized with calcium carbonate at boiling temperature to precipitate the free and loosely combined SO_2. The gas produced was removed, measured and analyzed at frequent intervals by means of an improved Orsat apparatus. In order to analyze the solution periodically and at the end of the fermentation it became necessary to develop a complete and systematic analysis which has since been published *(4)*. In this scheme of analysis the composition of sulphite liquor in various stages of fermentation was expressed in terms of solids, formic acid, acetic acid, calcium oxide, sulphur as sulphate, free SO_2, loosely combined SO_2 and sulphone sulphur, sugars as pentoses and hexoses, lignin, furfural, acetone, ethyl alcohol and methyl alcohol.

With this improved technique it was possible to add considerably to our knowledge both of the micro organisms and the mechanism involved. Under the direction of B. S. Henry, of the Bacteriology Department, bacterial counts were made during the entire fermentation periods. In one publication *(5)* occurs a description of 13 bacteria that were isolated and studied in pure culture. They belonged to five species not heretofore described. In another study *(6)* the bacteria that were active in gasifying the organic matter of sulphite liquor were isolated, and 19 strains selected for detailed pure culture study. The results of this study show that five distinct and new species were present. As a group the new species are characterized by their diversified and vigorous saccharolytic action. One of them named Clostridium polyfermenticum caused active foaming within a few hours and in two days converted all of the sugars in sulphite liquor into butyric and acetic acids. Since commercial extraction methods for these acids from water are now in operation in the wood distillation industry, it is obvious that the use of the new organisms would

---

* Presented at the meeting of the Pacific Section of the Technical Association of the Pulp and Paper Industry, Portland, Ore., Nov. 7, 1936.

[1] Member TAPPI, Professor of Chemical Engineering, University of Washington, Seattle, Wash.

be effective in the separation of sugars from waste liquor if so desired. Since all of these organisms require the presence of some protein matter, it is obvious that waste liquor and domestic sewage are mutually helpful in their gasification by these organisms.

The results of the 340 days' incubation study *(7)* enable us to form a nearly complete conclusion regarding the gasification of sulphite liquor. A methane type of fermentation took place which resulted in a complete gasification of the sulphite liquor except in lignin. That is, all sugars both pentoses and hexoses, and other organic compounds were destroyed and the lignin lost nearly half of its methoxyl content. The gases evolved were carbon dioxide, methane and hydrogen. Computed on the basis of sulphite waste liquor formed per ton of pulp manufactured the heating value of the gases produced during fermentation was equal to 4,767,500 B.t.u. Seventy-three per cent of the gas was produced in the first 40 days and 92 per cent of the gas was produced in 70 days.

Although the lignin sulphonic acid of the waste liquor had lost a part of its methoxyl content, it still retained its characteristic properties. We are now justified in drawing a final conclusion *(8)* by interpreting these experiments as follows: The pollution effect of sulphite waste liquor is due chiefly to the sugars. These may be destroyed by gasification in anaerobic methane fermentation leaving the lignin practically unchanged. The sugars can also be changed into butyric acid by a pure culture fermentation and the acid extracted leaving only the lignin in the residue, but its 10 day B.O.D. is only one fifth of that of the original liquor. Hence, its polluting effect is slight. When greatly diluted with water, lignin, however, is completely oxidized biochemically to carbon dioxide and water. If the lignin is removed first from waste liquor, then the problem of disposal is very simple being precisely the same as that of sugar refinery residues whose short fermentation periods in tanks and ponds completely destroy the organic matter and free it of polluting effects when discharged into small streams or water courses. If the lignin is not removed, the sugars may be quickly changed into butyric acid or slowly by methane fermentation into gases and the residues greatly diluted in order to oxidize biochemically the lignin. In practice, large dilution will, of course, oxidize all organic matter as is evidenced by the constancy of composition of sea water.

No evidence of toxicity to micro organisms by sulphite waste liquor was found in the investigation, lignin retarding the fermentation but not destroying it. There remains yet the problem of methane fermentation in pure culture to be solved, and it is now the subject of a very interesting doctorate thesis that is well under way. If a method for controlling and especially accelerating methane fermentation can be found it will, of course, make possible the discharge of waste liquor into small water courses without detriment or danger of pollution.

Adhesive Properties of Waste Liquor

Two minor studies made by chemical engineering students in their undergraduate thesis work touch upon the adhesive properties of sulphite waste liquor. The well known adhesives of industry, glue, casein, and starch are all of a colloidal nature. The organic substances in solution in waste liquor are derived from the non cellulose components of the wood such as lignin, pentosans, hexosans, and resins, all of which are colloidal in character. Under the stresses set up by acids, temperature and pressure these natural substances are converted into sugars and lignin derivatives which resemble the glue-like bodies obtained from various plant and animal organisms.

In the first one of these studies J. J. Maas laid out two lines of experimental procedure: (1) its effect upon plasticity and workability of clay and (2) its effect upon the workability of Portland cement mixtures. For the measurement of the plasticity of clay, the Bingham-Green plastometer is generally used. It provides a means of measuring the rates of flow of a plastic material through an orifice under different pressures using compressed air for the application of pressure which is measured by a manometer. Maas designed a much simpler and cheaper device out of brass pipe with a steel plunger similar to the ordinary grease gun. Instead of a handle his "pressure gun" as he called it had a platform on which varying loads were placed to force the clay through the gun and orifice. The rate of flow of the clay paste through the orifice was then determined by catching and weighing the amount of clay forced through the orifice per unit time.

In his experimental work, Maas used a low plasticity Oregon clay which was screened through a 40 mesh screen. The clay-water ratio was kept constant, the sulphite liquor being added on the basis of its solids. With the use of different mixes, he was able to plot the pressure (in kg.) against rate of flow (in grams per quarter minute) and from these values obtain an expression of yield and mobility values of the clay. Although no conclusion was drawn from his measurements of plasticity, the important effect was that less water was required to bring the clay to a given workability when sulphite liquor had been added. This lesser quantity of water produces less shrinkage in drying and consequently the breakage of ceramic wares is less when sulphite liquor is added.

In his study of the workability of Portland cement mixes, Maas used an apparatus made up of a small dynamometer outfit developed in a previous investigation of the workability of cement mixtures containing metallic soaps. This apparatus measures the force required to turn a small cylindrical mixer in a vertical plane, the inside of whose circumference is studded with nails. Thus the factors effecting the force are: (1) the resistance to pulling the nails through the concrete mass and (2) the distance the concrete is carried up from the bottom of the mixer by rotation. The apparatus which measures the force required to turn the mixer is a paper scale which is calibrated to read the force in grams by suspending a series of weights on the arm and noting the deflections recorded on the scale.

In making the tests with the dynamometer the following mixture was used: 1,000 grams sand, 300 grams cement and 300 grams water. The sand and cement were mixed dry after which the 300 grams of water containing varying amounts of sulphite waste solids were added. The motor was immediately restarted and the readings of the force as read on the scale were taken at one minute intervals for a period of ten minutes. These results show that the addition of sulphite waste solids definitely increases the workability of cement mixtures in the ratio of about 895 to 590. The initial smaller quantities of sulphite liquor is, however, much greater than the additional increase in workability effected by the further addition of the liquor.

In an attempt to interpret these facts the surface tension of solutions of sulphite liquor solids in water was determined with a DuNuoy Tensiometer. These results showed first that the initial small quantities of sulphite waste solids effected a much greater lowering of surface tension than the additional lowering effected by larger amounts of the sulphite solids, and second that a decrease in surface tension of the liquid is accompanied by an increase in workability.

When compressive strength tests were later made on the mixes employed it was found that even the smaller initial quantities of sulphite liquor decreased the strength

from 2,000 to as much as 50 pounds per square inch, used with larger amounts the cement blocks did not set, thus showing the futility of its use in Portland cement mixes.

One of the incidental results of the effect of adding sulphite waste liquor to mineral aggregates was the measurement of the so-called dry strength of plastic bodies. Starting with a clay that conformed to the specifications for clay binders laid down by the Bureau of Public Roads, and keeping constant the amounts of water and clay, varying quantities of sulphite solids were added to mixes, later made into cylinders for compressive strength tests. The compressive strength of air dried clay with water alone was 550 pounds per square inch and with sulphite solids added ranged from 720 to 750 pounds per square inch.

These results on the increase of dry strength of clay mixtures led Marion H. Norton to carry on an investigation on the effects of adding sulphite waste liquor on a graded soil mixture, with especial reference to its use as a road binder. For the soil mixture the composition recommended by the Bureau of Public Roads was approximated and its liquid limits 21.0 and plasticity index 7.0, were well within the range specified for Group A-1 aggregates.

The experimental procedure consisted in making up mixtures of soil, sulphite liquor, lime and calcium chloride, molding them into 2 inch cubes and testing them when dry for compressive strength. These strength values were plotted and curves drawn through the field of values. The variation in these values was due to the tendency of sulphite liquor to migrate toward the surface leaving the cubes non homogeneous. As the evaporating water flowed toward the surface, the colloidal particles apparently moved along with it. Consequently when dry cubes had a low sulphite liquor concentration in the center and a high concentration at each face. To overcome this movement of the liquor, the cubes were removed from the mould as soon as they became dry enough to retain their shape.

Qualitatively it may be said from the tests made that the presence of sulphite liquor in a soil increases both the cohesiveness and the elasticity of its particles. The effect of lime was found to increase the compressive strength if not in excess of 10 per cent of the solids. Larger quantities apparently bring about a precipitation with a loss of cohesion. Smaller amounts of lime act to prevent the migration of liquor toward the surface without destroying the colloidal properties. In mixing the sulphite liquor with the soil, it was noticed that the liquor showed no tendency to wet the soil particles. This is contrary to the observation previously made that sulphite solids decrease the surface tension of water and such a liquid should wet soil particles more easily than does pure water. Inhibiting the migration of the colloids by preferential adsorption on soil particles is the objective to be sought in future laboratory studies of waste liquor.

Dust Proofing of Roads

It is of interest to recognize at this point the use of waste liquor for dust laying in which the property above noted constitutes an important factor. Since 1924 most of the waste liquor of the Inland Empire Paper Company has been used for dust laying; at first by the township in which the plant is located on the natural soil of the roads. It was found quite satisfactory and the adjoining townships likewise used it on their roads. In 1932, the city of Spokane began to substitute waste liquor for water in its sprinklers and since that date these authorities have taken all the waste liquor available during seven or eight months of the year. In the streets of residential districts two to three applications are required each season to make a hard practically dustless surface on the street.

More recently the Rainier Pulp and Paper Company, Shelton, has similarly utilized a portion of its sulphite waste for the so-called dust proofing of roads. In 1934, a small experimental unit was set up to produce a concentrated liquid containing 46 to 48 per cent solids. Such a liquid is convenient for transportation in tanks that can be filled and emptied by pumping. Before application to roads, the material is usually diluted 50-50 with water resulting in a liquid that contains about double the solids in ordinary digester waste-liquor. As in Spokane, considerable success has been attained from the outset for this use of sulphite waste. During the first year some sixty miles of roadway were dustproofed in Southwestern Washington and during the present year this mileage has increased to 1,500 miles in Washington, California and Montana and shipments have been made to New Jersey, Maryland and Alaska.

Work carried on by the writer with this material on the same formulas as are used in Sweden has given indications of the usefulness of the material as a road binder. That is to say, by changing the density of the liquid and by utilizing the effect of electrolytes and pressure on the surtrack in the athletic stadium of the University, using the face tension it is possible to cause the material to adhere to mineral particles, even though they are non colloidal. In this way the migration of the sulphite waste solids to the surfaces is prevented and they act as an adhesive binder similar to petroleum and tar in the respective macadams for which they are noted.

In addition to the studies reported in this paper, Professor Beuschlein and his students have been interested in certain chemical engineering operations that involve the properties of sulphite waste liquor. These have dealt with studies of the heat transfer coefficients for evaporator and heaters employed in the concentration of sulphite waste and in a study of the relations of density and viscosity in varying concentrations of solids contained in the liquid.

Professor Kobe has further studied the colloidal properties of sulphite waste liquor. Results obtained during the ammoniation of sulphite waste liquor showed that the precipitation of the solid by ions was influenced by salts already present. This led to a general study now in progress on the precipitation by ions and non electrolytes, and the movement of the colloidal particles under the influence of the electric current.

In concluding this brief outline of recent studies of the properties of sulphite waste, one should emphasize the importance of more fully knowing its properties in order that it may take its proper position in American industry. Its successful utilization in this state and its utilization at Wausau, Wis., for fuel, plastics, tanning and other purposes bear testimony to the fruitfulness of research in this field of pulp mill operations.

Literature Cited

(1) Benson, H. K., *Ind. Eng. Chem.*, 24:1302 (1932).
(2) Pollock nd Partansky, *Ind. Eng. Chem., Annual Ed.* 6:330 (1934).
(3) Benson and Partansky, *Proc. Nat. Acad. Sci.* 20, No. 10:542-551 (1934).
(4) Partansky and Benson, *Paper Trade J.* 102, No. 7:29-35 (1935).
(5) Henry and Partansky, *Proc. Nat. Acad. Sci.*, 21, No. 4:191-200 (1935).
(6) Partansky and Henry, *J. Bact.*; 30:559 (1935).
(7) Partansky and Benson, *Proc. Nat. Acad. Sci.*; 22, No. 3:153-158 (1936).
(8) Benson and Partansky, *Ind. En. Chem.*; 28:738 (1936).

New Bristol Bulletin

The Bristol Company has published an eight page bulletin, Number 483, on its new line of Low Range Pressure and Draft Recorders and Controllers. Copies of this publication will be sent on request.

Obituary

Christian Benninghofen

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, March 22, 1937.—Death claimed Christian Benninghofen, 81 years old, one of the most prominent industrialists in the Miami Valley, on March 16, at his residence, 807 Dayton street, Hamilton. A recent attack of pneumonia led to his demise.

He became widely known to the paper industry and kindred lines because of his connection with the Shuler and Benninghofen woolen mills, makers of paper mill felts, one of Hamilton's greatest industries. The partnership was organized in 1858 by the late Asa Shuler and John W. Benninghofen, father of Christian.

Christian Benninghofen and William B. Snuler, sons of the founders, successfully continued the partnership and in doing so played an important part in the industrial life of the Miami Valley.

Mr. Benninghofen was born in Hamilton, September 25, 1855, the son of John W. and Wilhelmina E. Klein Benninghofen. He spent his entire life in Hamilton, being educated in the public schools of the city.

In August of 1881, he was united in marriage with Miss Anna Stahl, who died May 2, 1936. Four children were born to the union: Miss Elsa Benninghofen, who died five years ago; Paul Benninghofen, city councilman, who is carrying on the many enterprises in which his father was engaged; Mark Benninghofen, who died four years ago; and Mrs. William G. Werner (Margaret Benninghofen), of Cincinnati. Eight grandchildren and two sisters, Misses Pauline and Carrie Benninghofen, also survive.

D. Bradford Andrews

BOSTON, Mass., March 22, 1937—D. Bradford Andrews, for 25 years connected with the Oxford Paper Company at Rumford and later with the Oxford Miami Paper Company in Dayton, Ohio, died suddenly in Boston Thursday. He was the son of the late W. W. Andrews and Mrs. Harriet B. Andrews of Sheffield street, Portland.

Mr. Andrews was graduated from Portland High School and from Bowdoin College in 1906. He was a member of Delta Kappa Epsilon Fraternity, was past master of Blazing Star Lodge, F. & A. M., and a past commander of Strathglass Commandery, Knights Templar, both of Rumford.

Besides his mother, he is survived by his widow, Zephie Andrews of Rumford; two daughters, Mrs. Lois Clement, Westerly, R. I., and Ann Andrews of Rumford; two sisters, the Misses Marguerite and Katherine Andrews of New York City; and a brother William W. Andrews, Jr., of Boston.

John F. Sullivan

ARLINGTON, Mass., March 22, 1937—John F. Sullivan, aged 37, owner of the Sullivan Paper Products Company here, died last week.

Mr. Sullivan was a member of the Berlin, N. H., Council, K. of C., and formerly a member of the Mt. Benedict Council, K. of C., Somerville, Mass.

He is survived by his widow, Mrs. Helen May Sullivan; two sons, John and Leonard, and a daughter, Virginia, all of Arlington; his father, of Medford, Mass.; a brother, William J. Sullivan, of Medford, and five sisters, Miss Genevieve T. Sullivan, Miss Mary Sullivan and Miss Helen Sullivan, all of Medford; Mrs. Margaret Green, of West Medford, Mass., and Mrs. Orland Fritz, of Arlington.

The funeral was held this morning from his late residence, 15 Dartmouth street, Arlington. A solemn high mass of requiem was celebrated in St. Agnes Church, Arlington. Burial was in Oak Grove Cemetery, West Medford.

C. Nelson Gain

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., March 22, 1937—C. Nelson Gain, of Gain Brothers, who was widely known throughout the paper trade, died at his home in Toronto, on March 18. He was the youngest son of the late Thomas Gain, veteran paper salesman, and was prominently associated with the industry all his life. At various times he was connected with the Anglo Canadian Pulp and Paper Company, the Canadian Vegetable Parchment Paper Company, the Garden City Paper Mills, and the Don Valley Paper Company, in all of which he held responsible positions. Three years ago he went into partnership with his brother, T. E. Gain, the firm representing the Pacific Mills of British Columbia. Mr. Gain was a past president of the Rotary Club of St. Catharines. Surviving are his wife, four sons and two brothers.

Trend Toward Opacity In Papers

The trend toward opacity in papers is becoming stronger, and it is spreading to all grades of papers. "The Millers Falls Paper Company," advises H. & J. Shapiro Company, Inc., of 40 West 25th street, New York, that they "are extending the line of Opaque papers, and the latest addition is Millers Falls Onion Skin Opaque.

"This well known brand of 25 per cent Rag Onion Skin is now available from stock in a specially treated sheet for unusual opaqueness. Besides its opacity, the white surface color of this sheet gives a new brilliancy of background to printing and typewriter inks, as well as carbon copies. This Opaque Millers Falls Onion Skin is available in white only, basis 9 lb. cockle and dull finish.

The uses for this white paper are nearly unlimited. It saves postage and filing space. It has the crisp, attention-compelling character of a high quality rag onion skin. It can be printed both sides.

Opaque Millers Falls Onion Skin offers alert printers a paper suggestion that will develop profitable orders for advertising broadsides, price lists, and office stationery of all kinds."

Leeds & Northrup Catalog Out

A 32-page catalog (EN-96) on apparatus for hydrogen-ion concentration (pH) measurements in laboratory and plant has just been issued by Leeds & Northrup Company, 4934 Stenton Avenue, Philadelphia.

The catalog describes and lists the latest forms of L & N electrodes, potentiometers, a potentiometer-electrometer and galvanometers for determining the pH of aqueous solutions for research and analytical purposes in the laboratory and for process control in the plant.

For the latter purpose, equipment is described for spot tests, and for continuous recorded measurement, which, in the case of certain specific processes, leads to continuous recorded measurement with automatic control.

Data on applications, advantages, limitations, useful ranges, limits of error, potentials, etc., simplify the selection of electrodes, potentiometers and galvanometers required. As a consequence there should be no difficulty in choosing the most suitable equipment for any proposed application.

Stream Pollution Measures

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 24, 1937—Carl E. Whitney, of Wise, Whitney & Parker, appeared last week before the House Committee on Rivers and Harbors in connection with hearings dealing with several stream pollution bills. He represented the American Paper and Pulp Association, the Newsprint Manufacturers of the United States and the National Paperboard Association. He said that the paper industry generally does not favor the passage of any drastic stream pollution measure at this time but suggested legislation looking to a study of the whole matter.

Mr. Whitney told the committee that the three associations which he represented are the central organizations representing all of the primary manufacturers of paper and paperboard in the country, which industry comprises some 1,000 mills located in 37 states. Mr. Whitney said:

"During the last Session of Congress a number of bills dealing with the subject of water pollution were introduced, both in the House and in the Senate. On February 26, 1936, a Sub-Committee of the Committee on Commerce of the Senate held a hearing with respect to Senate Bill 3958, introduced by Senator Lonergan of Connecticut, and on that date the industries which I am now representing appeared and made a presentation of their position with respect to that bill.

"This statement is found on page 147-156 of the Record of that hearing, to which statement I now refer and respectfully ask this Committee that it consider the same in connection with a hearing which is now being held with respect to H. R. 2711 and H.R. 3419.

"The industry then took the position to which it still adheres, that in the present state of limited knowledge of remedies for the existing problem it is opposed to the passage of any drastic control bill, such as S. 3958, introduced and considered during the last Session; S. 13, now before the Senate Committee on Commerce; and H. R. 3419, now before this Committee.

"After full consideration of all of the Stream Pollution bills now before both the Senate and House Committees, the Industry takes the position that it favors and urges the enactment of a Study Plan Type of bill, such as H. R. 2711.

"From the extensive hearings held last Session before the Senate Committee on Commerce and before the House Committee on Rivers and Harbors, the records of which are now before you, it will be noted that there was ample presentation of the facts both on behalf of the proponents and the opponents of this legislation.

Representatives of numerous industries and of both State and Federal Departments have testified fully. We do not feel that it is now necessary to take the time of this committee to repeat and reiterate the whole or any part of that which has already been said. We do feel, however, we should respectfully call to your attention the fact that this great industry is in favor of the enactment of H. R. 2711."

Hinde & Dauch's Registration Statement

[FROM OUR REGULAR CORRESPONDENT]

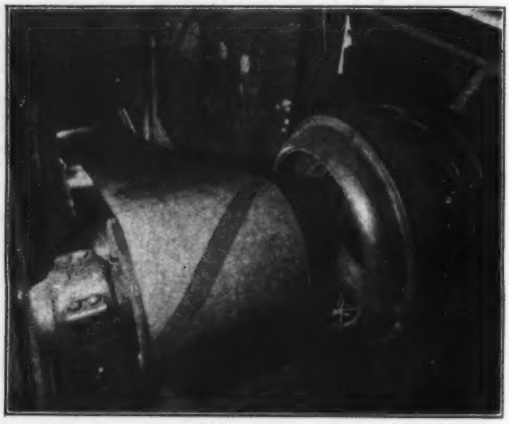
WASHINGTON, D. C., March 24, 1937—The Hinde & Dauch Paper Company, Sandusky, Ohio, has filed a registration statement with the Federal Securities and Exchange Commission covering 36,000 shares of $100 par value $5 cumulative convertible preferred stock and 90,000 shares of $10 par value common stock including scrip certificates for fractional shares, to be reserved for conversion of the preferred stock. The proceeds are to be used together with other funds to redeem the company's outstanding $6 Series A cumulative preferred stock.

Transmission Belt Remodeled

In their zeal to obtain efficiency, companies frequently consign to the junk pile old equipment which might, with a few minor changes, be readily adapted to other operations within their plant. However, the Franklin Board and Paper Company of Franklin, Ohio, overlooked no such opportunities when they had occasion recently to make alterations in their motive power equipment.

In September, 1931, this company installed a 101 foot 40" 10-ply Goodrich Highflex belt on a Corliss engine drive. In the spring of 1936, after the belt had seen almost five years continuous service, it was deemed advisable to abandon the drive.

Considering length of service and the fact that they had no other drive requiring a belt of this size, it would have been an easy matter for the management to justify its disposal from a cost angle. Examination, however, showed it to be still in excellent condition and capable of many more months operation.



REMODELED TRANSMISSION BELT

The belt was returned to the Goodrich plant where it was cut to 60 foot length and 32-inch width, stripped down from 10 to 9 ply and then made endless by the Plylock Splice. Upon completion of this work, the remodeled belt was installed on the 250 h.p. drive, as shown in the attached photograph. It has now been in operation almost a year and the user is highly pleased with the operation.

Conversion of belt over to this new drive resulted in little or no loss of material. The remaining 40 feet of belt, as well as the strip left from the original cutting down operation, were cut into six and eight-inch widths and stripped to four-ply for various transmission purposes about the plant.

Cigarette Paper Bids Asked

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 10, 1937—The Ministry of Finance of Guatemala has made public a call for bids for the supply of cigarette paper for a period of five years according to a report from Commercial Attache, Howard H. Tewksbury, at Guatemala. The manufacture of cigarettes in that country is under the control of the government, and paper used for their manufacture must be purchased by the manufacturers from the Ministry of Finance. The expiration date on which the call for public bids will be closed has been set as May 31. Those interested in this may obtain additional details at the Administracion de la Renta del Tabaco, Guatemala City, Guatemala.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

New York, N. Y.—The Southern Kraft Corporation, 220 East Forty-second street, a subsidiary of the International Paper Company, same address, has preliminary plans under way for new kraft paper and board mill on site soon to be selected in the South. It will comprise a large group of one and multi-story buildings, with power house, pumping station and other mechanical structures, equipped for an initial capacity of about 220,000 tons of finished stock per year. Contract has been placed with the Beloit Iron Works, Beloit, Wis., for two special, high-speed, wide Fourdrinier machines and auxiliary equipment, and orders for other machinery and equipment will be placed in near future. It is expected to complete plans and begin work on new mill at early date, with completion scheduled early in 1938. The new plant is estimated to cost in excess of $8,500,000. Company has work under way on a similarly large mill at Georgetown, S. C., previously referred to in these columns, and new plant will closely duplicate this project. Work on erection is being carried out by day labor with company forces. It will be equipped for a capacity of close to 200,000 tons of kraft paper and board products per annum, and will represent an investment of approximately $8,000,000. This mill is scheduled to be ready for service next October.

Lansing, Mich.—The Weissinger Paper Company has approved plans for new one-story addition, to be used for storage and distribution. It is estimated to cost over $25,000, with equipment. General contract has been let to Arthur Foster, Lansing, and work is scheduled to begin soon.

Menasha, Wis.—The Marathon Paper Mills Company, Menasha Products Company Division, has asked bids on general contract for new two-story and basement addition, 60 x 250 feet, to be used for expansion in waxing and processing division. It is reported to cost over $85,000, with equipment. Building award will be placed soon and work placed under way. Company engineering department at main mill at Rothschild, Wis., is in charge of project. D. C. Everest is vice-president and general manager.

Pittsburgh, Pa.—The Fuller Label and Box Company, 444 Dargan street, manufacturer of paper boxes and kindred products, has awarded general contract to P. K. Construction Company, 30 East General Robinson street, for three-story and basement addition to plant, 50 x 90 feet, recently referred to in these columns. It is estimated to cost close to $65,000, with equipment. George S. Baton & Co. Union Trust Building, Pittsburgh, are engineers.

St. Louis, Mo.—The Waxide Paper Company, 1525 South Newstead street, manufacturer of waxed and processed paper products, has plans for new addition to plant, to be one-story and basement, estimated to cost over $35,000, with equipment. Bids have been asked on general contract and it is expected to begin work on superstructure at early date. Leonard Haeger, 3844 Utah place, St. Louis, is architect.

Philadelphia, Pa.—The Light Corrugated Box Company, Trenton avenue and Venango street, manufacturer of corrugated paper boxes and containers, has leased space in building at corner of Castor avenue and Sepviva street, totaling about 20,000 square feet of floor space and will use for expansion, including storage and distributing facilities. Company also has leased space in the former Lupton Building at Tulip and Westmoreland streets, aggregating about 13,000 square feet of floor area, and will occupy for similar purposes.

Hartsville, S. C.—The Sonoco Products Company, manufacturer of paper board products, chip board, paper tubing, etc., has arranged for the sale of preferred stock to total about $400,000, proceeds to be used for expansion and improvement program at plant, recently referred to in these columns. Main features of program include a two-story structure, 125 x 425 feet, for increased facilities for general production division, and another two-story building, 60 x 325 feet, for storage and distribution, as well as a new power house unit. Fiske-Carter Construction Company, Greenville, S. C., has the erection contract, on which work has begun. James L. Coker is president.

Los Angeles, Cal.—Acoustipulp, Inc., Subway Terminal Building, recently organized to manufacture special sound-absorbing pulp board products for walls, ceilings, etc; has established a new local plant at 1141 East Sixty-third street, and will develop capacity production at early date. Nathan Most is one of heads of new company.

St. Louis, Mo.—The Crown Can Company, a subsidiary of Crown Cork and Seal Company, Eastern avenue and Kresson street, Baltimore Md., plans installation of a paper-converting division in new can and container-manufacturing plant on Natural Bridge Avenue, near Clara Avenue, St. Louis, where tract of about six acres of land has been purchased. Labels and other paper specialties will be produced, as well as lithographed paper products. New plant will comprise a main two-story unit, 225 x 500 feet, and several smaller buildings, and will cost in excess of $2,500,000. Contract for general erection has been let to the Consolidated Engineering Company, 20 East Franklin street, Baltimore. Lucius R. White, Jr., 10 West Chase street, Baltimore, is architect.

New York, N. Y.—The Futuristic Paper Box Corporation, recently organized to manufacture paper boxes and containers, has leased a floor in building at 346 Carroll street, and will occupy for local plant.

Fernandina, Fla.—The Container Corporation of America, Inc., 111 West Washington street, Chicago, Ill.,

manufacturer of corrugated paper boxes and containers, has arranged revised plans for its proposed new pulp and paperboard mill at Fernandina, previously referred to in these columns, and present size of mill will be limited to an installed capacity of about 40,000 tons of finished kraft materials per annum, instead of about 100,000 tons, as initially proposed. At a later date it is proposed to build extensions and install equipment to bring the output up to the last noted figure. Contract for structural steel framing for initial buildings has been awarded to the Jones & Laughlin Steel Corporation, Third avenue and Ross street, Pittsburgh, Pa. General contractor for project is the Merritt, Chapman & Scott Corporation, 17 Battery place, New York, N. Y. New mill will cost close to $1,000,000, with machinery. George F. Hardy, 305 Broadway, New York, is consulting engineer. Walter Paepcke is president of company.

Kansas City, Mo.—The Central Can Company, Twenty-ninth street and Booklyn Avenue, manufacturer of fiber and other cans and containers, has leased a five-story and basement building at 1004-6 Santa Fe street, and will remodel and improve for early occupancy. Equipment will be installed for increase in present capacity.

Bristol, Tenn.—The Bristol Industrial Corporation, recently organized, is concluding negotiations with a manufacturer of cellulose rayon products, name temporarily withheld, for the construction and operation of a new local mill, and will assist in financing the project. The new plant will consist of several units and will be located on Eighteenth street. The initial unit will have facilities for the employment of about 300 persons and is estimated to cost over $600,000, with equipment. The Bristol Chamber of Commerce, W. A. Huddleston, secretary, is interested in the project.

Burnie, Tasmania—The Associated Pulp and Paper Mills, Ltd., has work under way on initial units for proposed new pulp and paper mills, and is placing orders for all required equipment. It is proposed to have the buildings completed by the close of the year, with plant ready for service early in 1938. Entire project will cost over $2,500,000. R. Woodhead is general superintendent.

New Precision Catalog

Bulletin 300 is a "Condensed Catalog on 'Precision'—Freas Constant Temperature Laboratory Equipment", now built solely by the Precision Scientific Company, 1730-1732 North Springfield Avenue, Chicago, Ill.

This 8-page two-color bulletin is the first literature published for several years on the Freas and Thelco lines of Constant Temperature Laboratory Equipment. It pictures and concisely describes all Freas and Thelco models of Incubators, Sterilizers, Humidity Cabinets, pointing out their respective applications and individual characteristics.

The bulletin also summarizes the salient features of construction; illustrates 28 models of both standard and custom-built Constant Temperature Baths; also shows an interesting variety of typical laboratory apparatus built to order.

New Keith Paper Sample Book

The Keith Paper Company of Turners Falls, Mass., has just issued a new sample book of its Keith's Rose Petal Wedding. This pleasing cream color is finding new popularity in wedding announcements. The beautiful kid surface is exceptionally adaptable for all engraving and printing purposes.

Horton With North Jersey Paper

The North Jersey Paper Company, Inc., of Saddle River, N. J., John C. Ware, Jr., president, advises of increased working capital through the purchase of an interest in the business by George A. Horton, who has been made executive vice-president in charge of purchases. He will not be giving his entire time to the business until about July 1.

Mr. Horton brings 25 years of experience in the jobbing and mill sales, having recently resigned as New York

GEORGE A. HORTON

District sales manager for the Kalamazoo Vegetable Parchment Company.

His fourteen years with that fine organization will be of inestimable value to the mills whose distribution in Northern New Jersey and Southern New York is intrusted to the North Jersey Paper Company, Inc., as well as to the trade which they serve. The corporation is a fast growing unit of the paper industry and enjoys a fine reputation with their customers and mills.

Graphitic Corrosion of Cast Iron

Investigation shows that the rapidity with which graphitic corrosion of cast iron sometimes occurs may be due to local galvanic effects between the porous graphitic coatings and the underlying metal.

The development of protective coatings is influenced by the size and distribution of the graphitic particles. Nickel alloy cast irons have favorable characteristics in this respect which probably account for their better performance in many corrosive environments.

A recent publication of the International Nickel Company, Inc., 67 Wall street, New York, entitled "Some Consequences of Graphite Corrosion of Cast Iron," deals with the mechanism of a type of corrosion of cast iron that results in the formation of a surface layer of residual graphite.

Copies of this new bulletin will be supplied to any readers requesting them.

E. T. Asplundh Elected Director

At the last directors' meeting of the Pittsburgh Plate Glass Company held in New York on March 3, E. T. Asplundh, who has held the position of assistant to vice president of the Columbia Chemical Division of the Pittsburgh Plate Glass Company, was elected as director to fill the place made vacant by the death of Edward Pitcairn.

Mr. Asplundh makes his headquarters at Barberton, and resides with his family at North Portage Path, Akron, Ohio.

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS

Chairman of the Board—Alexander Thomson

President—Logan G. Thomson

Executive Vice President—Reuben B. Robertson

Plant Mgr.—W. R. Crute

Superintendent—D. E. Cousins

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS

MORTON C. TUTTLE COMPANY

BOSTON — MASSACHUSETTS

BUILDERS

OF

THIS NEW PULP and PAPER MILL

AT

PASADENA, TEXAS

FOR

THE CHAMPION PAPER and FIBRE COMPANY

THE MORTON C. TUTTLE COMPANY HAS BUILT FOR

WEST VA. PULP AND PAPER COMPANY	Charleston, S. C.
WEST VA. PULP AND PAPER COMPANY	Mechanicville, N. Y.
WEST VA. PULP AND PAPER COMPANY	Covington, Va.
WEST VA. PULP AND PAPER COMPANY	Luke, Md.
WEST VA. PULP AND PAPER COMPANY	Williamsburg, Pa.
BROWN PAPER MILL COMPANY	Monroe, La.
MAINE SEABOARD PAPER COMPANY	Bucksport, Me.
TILESTON AND HOLLINGSWORTH CO.	Hyde Park, Mass.
SOUTHERN PAPER COMPANY	Moss Point, Miss.
PENOBSCOT CHEMICAL FIBRE CO.	Great Works, Me.
OXFORD PAPER COMPANY	Rumford, Me.
JESSUP AND MOORE PAPER CO.	Wilmington, Del.
CHAMPION PAPER AND FIBRE COMPANY	Canton, N. C.

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS

Champion Mill Starts At Houston

New Pulp Plant Completely Modern

At Pasadena, about twelve miles east of Houston, Texas, on the Houston Ship Channel (adjacent to the Deepwater Plant of The Houston Lighting and Power Company, the Champion Paper and Fibre Company has just completed its new bleached kraft pulp plant at a cost of approximately three million five hundred thousand dollars.

The site of the new mill is on 162 acres of the old Santa Anna Farm where General Santa Anna was captured after the Battle of San Jacinto.

To Produce Pine Pulp

At present, the purpose of the company is to produce pine pulp for the paper mills of The Champion Paper and Fibre Company, of Hamilton, Ohio, but the plant is so planned that equipment may readily be added to expand capacity and to manufacture paper.

The process to be used is the modernization of the bleached kraft process, the result of more than fifteen years development at the company's plant at Canton, North Carolina.

Modern Equipment Installed

The most modern type of all essential equipment have been installed, from barking drums at the receiving end of the mill to the stock room near the company's own wharf on the Ship Channel, including an electrolytic bleach plant, a 168 inch Fourdrinier pulp drier and two wet machines.

Power is to be generated on a 4000 kilowatt high pressure turbine, by steam to be led through a pipe line from the adjoining power plant of the Houston Lighting and Power Company.

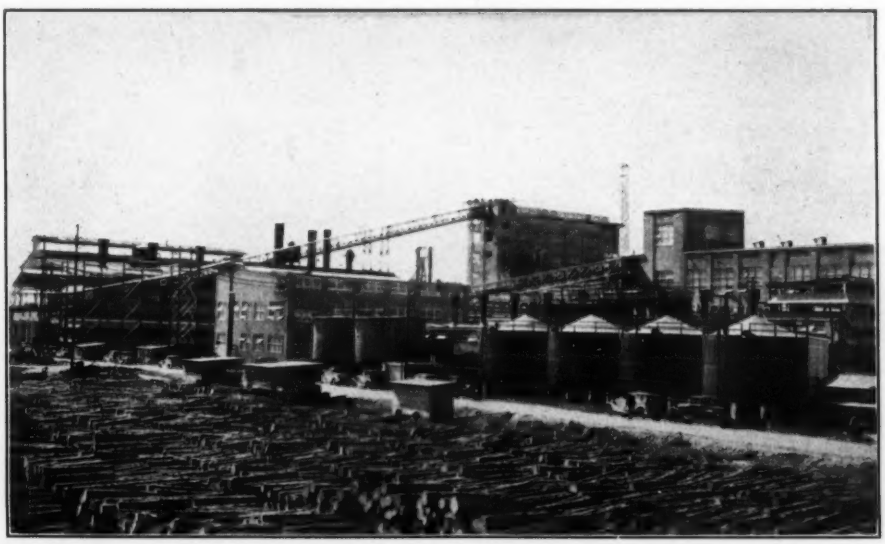
Gas is to be furnished by the Houston Pipe Line Company to the extent of 15,000,000 to 20,000,000 cubic feet per day.

Water is supplied from wells driven by the Layne-Texas Company—15,000,000 to 20,000,000 gallons per day.

Wood will be obtained from the pine forests of East and South Texas and delivered to the plant by truck, rail or barge.

Ideal Transportation

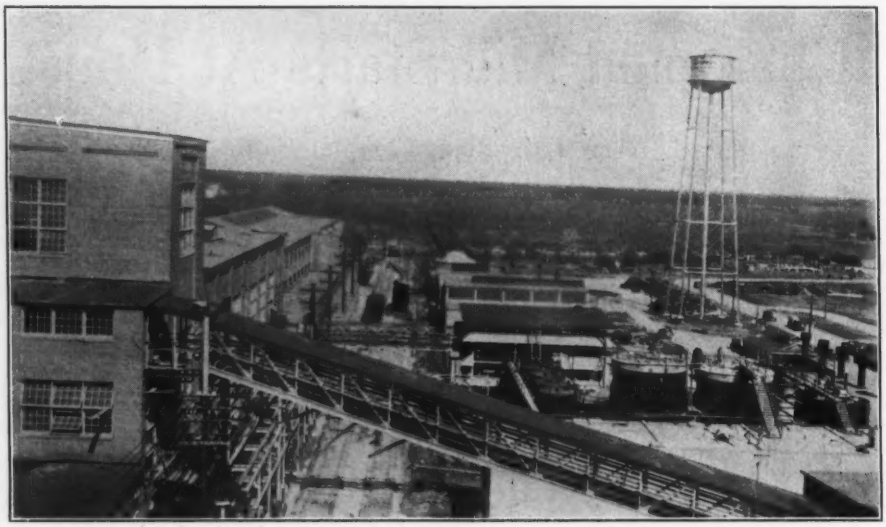
Transportation is secured by a frontage of approximately 2,500 feet on the Houston Ship Channel where barges can be loaded for travel to the company's finishing plant at Hamilton, Ohio, via the Intracoastal Canal, the Mississippi River and the Ohio River; also served by a spur from the Public Belt Railroad which



VIEW LOOKING SOUTH WEST SHOWING CHIP CONVEYOR BRIDGE. WOOD YARD AT BOTTOM.

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS



LOOKING NORTH UP MAIN RAILROAD SIDINGS FROM CHIP CONVEYOR.

connects with the numerous railroads entering Houston, Texas.

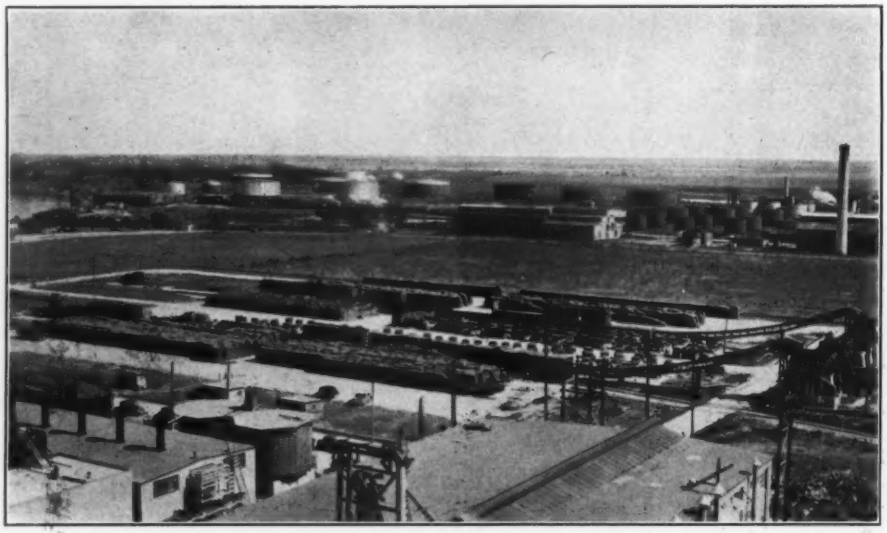
The company's wharf is favorably situated for shipment by barge on the Intracoastal and Mississippi waterways to all points in the Middle West and in addition has access to sea-going vessels for shipment abroad or to the Atlantic Seaboard.

Capacity of Plant

The capacity of the plant is from 175 to 200 tons of bleached pulp per day. Approximately 500 workers will be employed.

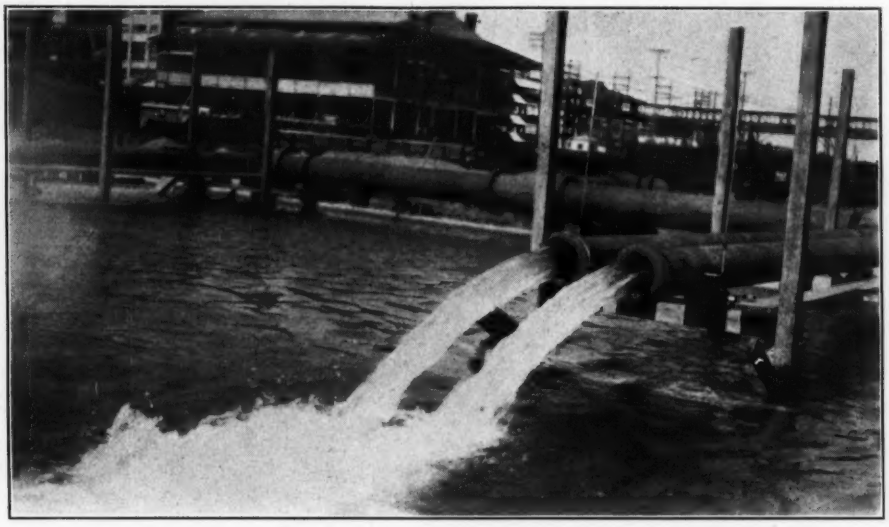
The general contractor was the Morton C. Tuttle Company of Boston, Massachusetts; the engineers, J. E. Sirrine & Co., of Greenville, South Carolina; the plant manager, W. R. Crute, formerly plant engineer of the company's plant at Canton, North Carolina; the superintendent, D. E. Cousins, formerly superintendent of the sulphate mill of the company's plant at Canton, North Carolina.

Officials consist of Alexander Thomson, chairman of the board; Logan G. Thomson, president; and Reuben B. Robertson, executive vice-president.



WOOD YARD FROM DIGESTER BUILDING.

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS



ORIFICES USED TO MEASURE FLOW DURING FINAL TESTS OF DEEP WELLS. DISCHARGING INTO CLEAR WATER RESERVOIR.

Wood Supply Assured

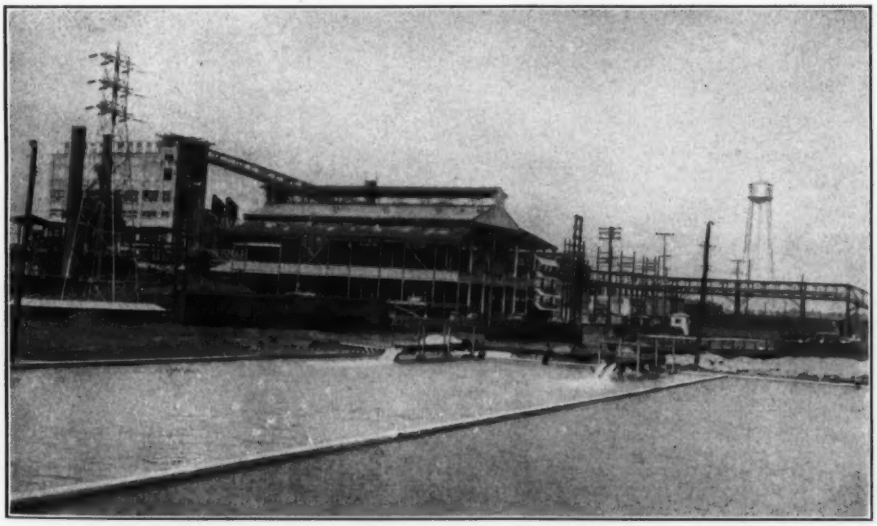
A long time supply of wood is assured by stumpage contract on nearly one million acres of land in Southeast Texas. The salt supply is assured by a lease of nearly thirty acres of salt deposits near by which can be delivered through a proposed pipe line.

The layout of the plant is such that equipment can readily be installed for increasing pulp capacity and for manufacturing paper.

The mill will be self contained as to production of chlorine and caustic soda and will produce lime from local raw materials.

History of Company

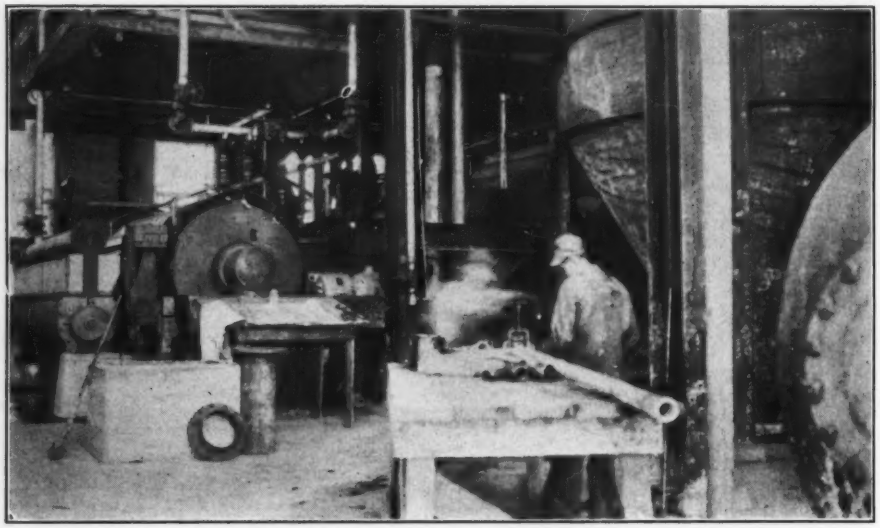
The Champion Paper and Fibre Company was organized in 1893 by the late Peter G. Thomson, of Cincinnati, and until recently was known as the Champion Coated Paper Company. It is the outgrowth of an original establishment, limited to the coating of papers,



CLEAR WATER RESERVOIR DURING FINAL TEST OF DEEP WELLS. RECOVERY AND DIGESTER BUILDINGS IN BACKGROUND.

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS



VIEW IN PIT ROOM.

which Mr. Thomson founded at Hamilton, Ohio, during the eighties.

Texas Plant Third

The Texas establishment marks the third plant of the company.

The Hamilton, Ohio, plant has always specialized in enameled and coated book papers for magazine and catalog purposes, but also manufactures a wide variety of uncoated papers, including magazine, book, bond, blank, register and paperboard.

The Canton, North Carolina, plant was established in 1907, under the corporate name of The Champion Fibre Company. Originally designed primarily to produce pulp for the paper machines at Hamilton, it has steadily expanded into a thoroughly integrated paper making enterprise.

Other Products Made

In addition to the manufacture of pulp by all four of the standard processes, three chemical and one mechanical, it also produces a wide range of paper and paperboard, chestnut tannin extract, soda bleach, caustic soda, ad-

LOOKING SOUTH EAST FROM DIGESTER BUILDING TOWARD RESERVOIR. TROSTOL PLANT AT BOTTOM.

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS

hesive extract, sodium resinate and turpentine.

The three plants are now operated under the one corporate name, The Champion Paper and Fibre Company, and are designated as the Hamilton Division, the Canton Division and the Houston Division.

Combined productive daily capacity is 250 tons of coated paper, 600 tons of uncoated paper, 620 tons of pulp, 120 tons of board, 110 tons of 25 per cent liquid chestnut tannin extract, 40 tons of caustic soda, 35 tons of adhesive extract, 10 tons of sodium resinate and 600 gallons of refined turpentine.

The company maintains two well equipped research laboratories, one at Hamilton and the other at Canton, to improve and develop new processes. It is also dedicated to a program of conservation of natural resources.

Its extensive reserves of timber in Western North Carolina have been under the supervision of a trained forester, and provision has already been made to encourage sound forestry practice in Texas by the employment of a graduate forester.

Equipment Manufacturers

Improved Paper Machinery Company, Nashua, N. H., Plate Screens, Washers and Thickeners, Knotters.

Wyatt Metal and Boiler Company, Houston, Tex., Steel Tanks.

Baldwin Southwark Corporation, Philadelphia, Pa., Hydraulic Presses.

Ingalls Iron Works, Birmingham, Ala., Structural Steel.

Laclede Steel Company, St. Louis, Mo., Reinforcing Steel.

D. J. Murray Manufacturing Company, Wausau, Wis., Wood Chippers, Barking Drums.

U. S. Cast Iron Pipe and Foundry Company, Burlington, N. J., Sulphate Evaporators.

Traylor Engineering and Manufacturing Company, Allentown, Pa., Lime Kiln.

Hedges Walsh Weidner Company, Chattanooga, Tenn., Digesters.

Dorr Company, New York City, Filters, Causticizing Equipment.

Oliver United Filters, New York City, Filters, Pumps.

Mortin C. Tuttle Company, Boston, Mass.

Houston Light and Power Company, Houston, Tex., Light and Power.

Houston Pipe Line Company, Houston, Tex., Natural Gas.

Goulds Pumps, Inc., Seneca Falls, N. Y., Pumps.

Henry Vogt Company, Louisville, Ky., Bark Fired Boilers.

Combustion Engineering Company, New York City, Recovery Boilers.

General Electric Company, Schenectedy, N. Y., Machine Drive.

Black-Clawson Co., Hamilton, Ohio, Pulp Machine.

Fibre Making Processes Inc., Chicago, Ill., Heaters and Pumps.

C. H. Wheeler Manufacturing Company, Charlotte, N. C., Evaporator Condensing Equipment.

Ingersoll Rand Company, Phillipsburg, N. J., Stock and Water Pumps.

J. O. Ross Engineering Corporation, Chicago, Ill., Exhaust and Ventilating Systems.

Nash Engineering Company, South Norwalk, Conn., Pumps.

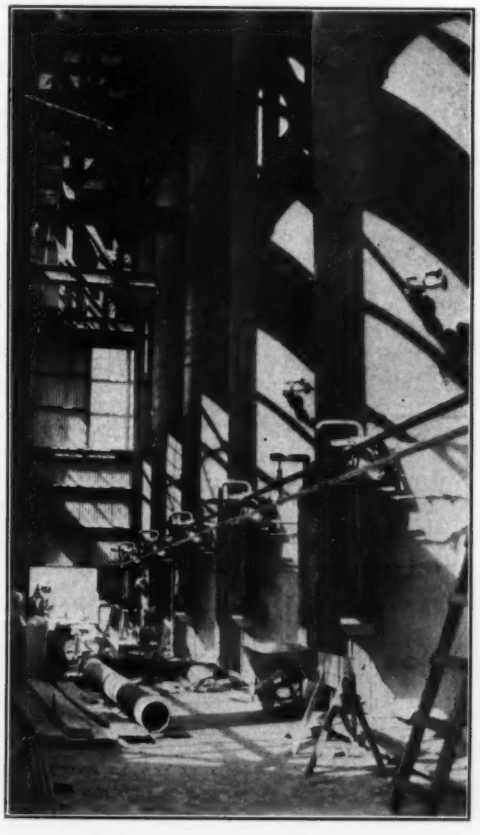
Jeffrey Manufacturing Co., Columbus, Ohio, Conveyor Equipment.

Buffalo Foundry and Machine Company, Buffalo, N. Y., Evaporator.

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., Motors and Starters.

Noble & Wood Machine Company, Hoosick Falls, N. Y., Agitators and Regulators.

Baltimore Cooperage Tank and Tower Company, Baltimore, Md., Wooden Tanks.



GROUND FLOOR OF DIGESTER BUILDING.

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS

Dorr Continuous Causticizing System In New Champion Houston Mill

With reference to equipment, Champion already had a Dorr Slaker and Classifier available, and in addition to these units the company is now installing the following:—

Two Dorr White Liquor, two-compartment Thickeners, 26′ in dia. by 16 ft. deep; One Dorr Green Liquor, two-compartment Clarifier, 30′ in dia. by 18′ deep; One Dorr Green Liquor, three-compartment Dregs Washer, 26′ dia. by 22′ deep; Three Causticizing Agitators with 9′ by 6′ steel tanks and 34″ Duplex Turbo-Mixer impellers; Two No. 2SSM Dorrco Suction Pumps for the two Green Liquor Clarifiers and Two No. 4SSM Dorrco Suction Pumps for the two White Liquor Thickeners.

The reclamation of lime mud and green liquor is accomplished in a Dorr Continuous Causticizing System. The feature of this system is that the caustic plant operates with a continuous uninterrupted movement of all solid and liquid process materials instead of the intermittent progression practiced in the older batch or semi-batch systems.

The plant is designed to produce strong white liquor sufficient for cooking 135 tons of kraft pulp per 24 hours, at 100 cu. ft. of liquor per ton of pulp and approximately 7 lbs. of total alkali per cu. ft. of liquor.

Although the operation of the Dorr system is entirely homogeneous and simultaneous, it may be divided into five main purpose-groups. These groups are:

1. Lime (Calcium oxide) Handling; 2. Slaking and causticizing; 3. White liquor production and lime mud (calcium carbonate) washing; 4. Clear green liquor production and dregs washing and 5. Lime mud (calcium carbonate) dewatering and reburning.

Since the process is continuous, all the above steps are knit together.

Fresh lime, usually bought as lump lime and crushed at the pulp mill, is purchased as pebble lime. A bar screen prevents oversize lumps larger than one inch size from entering the fresh-lime bin.

Fresh lime is conveyed from storage to fresh-lime bin by means of a Jeffrey bucket elevator, having an intended capacity of four tons per 24 hours.

A bin for re-burned lime duplicates the fresh-lime bin alongside. A Jeffrey scraper conveyor and bucket elevator of an intended capacity of approximately 1½ tons of burned lime per hour delivers the re-burned lime from the rotary kiln to the reburned lime bin. A screen scalps off one inch overside.

Each bin is 11 feet diameter x 12 feet high on the straight side, with coned bottom. Each is designed for approximately 20 tons storage capacity.

The screw conveyor feeds into a 4 feet x 19 feet Kilby Rotary Lime Slaker especially designed for this duty. The slaked lime is ejected from the end opposite the feed, through a rotary scalping screen that rejects ½ inch oversize.

The Slaker discharges into a Dorr Bowl Classifier. The duty of the Classifier is to reject the settleable impurities, which are raked up the inclined body of the Classifier, and washed with a spray of hot water to salvage all lime and solubles.

The slaking of the lime is done by clarified green liquor, a portion of which is piped into the feed end of the Slaker, a portion into the Slaker's discharge screen to keep the feed chute of the Classifier clear and a portion is fed into the Classifier body.

The Classifier has the nominal dimensions of 18 inches x 18 feet 4 inches x 4 feet Bowl diameter. It is the new model FR of the Dorr Classifier series. Its bowl launder discharges a cleaned slaked lime suspension in green liquor. This is pumped by a Gould Centrifugal Pump to the Causticizer group.

The Causticizers are three in number, set in series to minimize liquid by-passing. Each is hung in a tank 7 feet 6 inches diameter x 6 feet deep with dished bottom and flat top with a vent pipe to the roof.

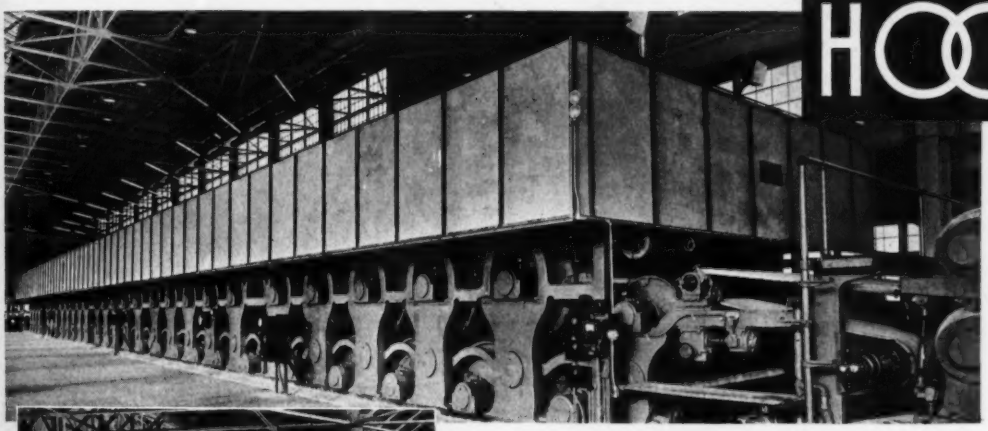
The plans for this installation were prepared by Mr. George F. Hardy of New York with the cooperation of The Dorr Company, Inc.

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS

"they're tops" . . .

WHEN IT COMES TO
EFFICIENCY; DURABILITY

ROSS
Removable
Panel
HOODS



as installed on the modern new machine at

The Champion Paper & Fibre Co.
NEW MILL AT HOUSTON

Another of the industry's newest and best equipped machines goes into production protected by a modern Ross Machine Hood. Protection against damage and expense due to fire, vapor, corrosion, warping. Assurance of quick access to dryers and rolls without any interference with the normal operation of the machine. They're the modern hoods—"tops" for modern machines.

For other exhaust and ventilating apparatus in this notable new mill, Ross Systems were specified. We are proud of this endorsement by one of the industry's best known manufacturers.

J. O. ROSS ENGINEERING CORPORATION

Main Office — 350 MADISON AVE., NEW YORK, N. Y.

201 North Wells St.
CHICAGO

12953 Greeley Ave.
DETROIT

2860 N. W. Front Ave.
PORTLAND, ORE.

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS

Install Most Advanced Machine

In any new paper mill development, the paper machine is at once the most spectacular and interesting feature of all. It might well be likened to the star in a drama on the stage or screen.

The machine at Houston was designed and built by The Black-Clawson Company, and it is unquestionably the most advanced piece of equipment of its kind so far produced. There is nothing else in the entire industry like it.

One of the outstanding features has to do with the selection of materials used in its fabrication. That is to say that there is practically no ordinary steel or iron used, those materials having largely given way to bronze because of its more non-corrosive characteristics.

A great deal of stainless steel has also been employed and for the same reason. Even the screws, where required, are of stainless steel, showing the lengths to which Champion has gone to make this machine non-corrosive and more durable.

The Fourdrinier wire is 80′ long and 166″ wide. There are seven suction boxes, all of non-corrosive material. The table and wire rolls are rubber covered and anti-friction bearing mounted.

The Fourdrinier part is equipped with shake and, should Champion at a later date discontinue the manufacture of pulp on the machine and go over to the manufacture of paper, it will be a very simple matter to make the shake operative. For the present, this part is operating without shaking.

Should the machine ever be converted into a paper machine, it is intended to operate at 1,000 feet per minute.

Another feature of this machine is the fact that from end to end all frame work is of the new Black-Clawson box type of construction. There are no ribbed castings in the frame work at any point. In other words, the Fourdrinier part, presses, drier section and duplex cutter at the finishing end are all mounted in box type frames.

This machine has one suction press and two plain presses.

Mention has already been made that the table rolls are mounted in anti-friction bearings and it is also interesting to know that the bearings are collar oiling and that, drier section excepted, all rolls have been balanced dynamically.

The drier section is composed of fifty-six 60″ driers with a 36″ diameter lead-on drier. It has a Sheahan rope carrier to facilitate matters when starting up after a shut down or in taking the sheet over after a break.

Speaking of the drier section, mention must be made of the fact that the packing boxes are of Shartle manufacture and the gears Maag cut to reduce the customary rumbling and vibration almost invariably found in drier sections.

This drier section also features Bowser lubricating and a Coe Drainator system.

This machine is at the present operating without felts but felting frames are in place and should occasion require, the rest of the felt work can very quickly be installed at a later date. The heavy duty duplex cutter at the finishing end is also worthy of description.

The accurately balanced, heavy-duty cutter bars are driven by greatly over-capacity V-belt texrope drives to assure cutting accuracy under shock. Knives are of high speed steel.

The use of texrope drive also permits the knife to be reset for square without loss of driving efficiency. This eliminates all tendency for gears to break as is characteristic when gears are used. Noise and inaccuracy are also reduced to the absolute minimum through the use of texrope drives.

Frames are of a heavy box-type construction, as already explained.

Speed changers, mounted directly behind the cutter, are of the latest vertical type, and, because they are connected directly to the knives and draw roll shafts, very compact and require fewer belts.

All draw rolls may be equipped with anti-friction bearings and rubber coverings if desired.

Guard rolls are located ahead of draw rolls.

The first set of draw rolls is driven separately, allowing these rolls to turn with both knives struck out. This is helpful when the cutter is not in use and the sheet has to be led over these rolls directly to the reel or winder.

Tapes, driven by a variable speed drive, are adjustable across the machine.

Each knife may be equipped with a separate cut-off clutch.

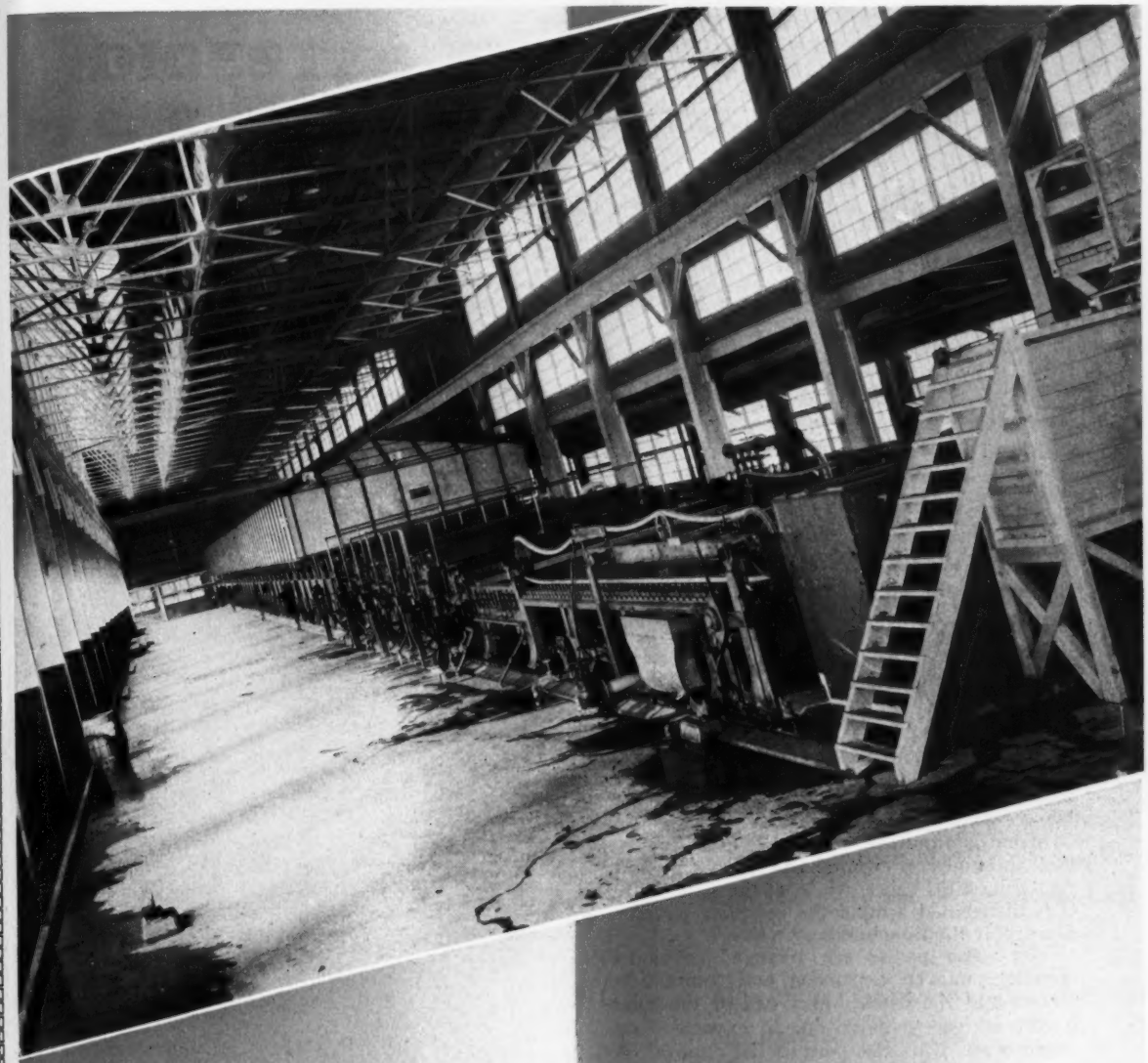
Each machine is equipped with patented telescopic guide boards.

Now for the latest on operations, remembering that this new machine has been in operation only a few weeks.

Tests so far taken disclose that the stock is going to the driers as high as 47 per cent A.D., that they have been able to operate at the rate of 185 tons a day, that the variable speed machine load is around 40 h.p. per 100 feet of speed.

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS



The new Fourdrinier at Houston was designed and built by the Black-Clawson Company. The extensive use of non-corrosive metals and box-type framework are two of its many features. Furthermore, while at the present time intended only for the manufacture of pulp, a few minor changes will convert it into a high speed paper machine. The Black-Clawson Co., Hamilton, O.

BLACK-CLAWSON

OWNERS OF SHARTLE BROTHERS

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS

Vertical Blow Down Condensers Reduce Steam From Digester System

Blow Down Condensers

The C. H. Wheeler Manufacturing Company, of Philadelphia, Pa., furnished two—Type W Vertical Digester Blow-Down Condensers at the new mill of the Champion Paper and Fibre Company at Houston, Tex., to condense the steam released from the Digester system,

The design of these units is such that less than 30 per cent of the volume in the shell is taken up by the tubes, numerous clear lanes are provided for steam distribution and cleaning purposes and a series of hinged, quick opening, covers are provided on the shell opposite each clear lane for high pressure washing of the surface. A series of top washdown nozzles connected to a common water manifold are installed for washing the surface between blows.

Steam is admitted into an eccentric belt on the shell and is prevented from impinging directly upon the tubes, while, at the same time, it is distributed around the complete circumference of the tube bundle.

The water passes are arranged so as to eliminate uneven expansion and contraction strains and the entire lower end of the tube bundle is free to move due to expansion or contraction. This also permits the removal of the entire tube bundle as a unit from the shell.

Non-condensable gases are removed from the shell at the top through a suitable opening.

High pressure water nozzles are provided through the lower section of the shell to permit washing of any pulp which may accumulate due to the main surface washing system, from off the lower tube sheet out of the unit through the drain.

Evaporator Condensers

To condense the vapor from triple effect evaporators, each of which is concentrating liquor and maintain 4″ Hg. absolute.

The C. H. Wheeler Manufacturing Company furnished two Horizontal Surface Condensers, constructed with cast iron shells, three pass water design, Muntz metal tubes, tube sheets and baffles.

These units were similar to those previously furnished for use in other mills of the same purchaser.

Air Pumps

The C. H. Wheeler Manufacturing Company furnished two—Twin Type Tubejet Air Pumps with after condensers, each consisting of two single stage elements, and each of which is capable of maintaining 8.0″ absolute with steam at 110 lbs. pressure.

These units were similar to those previously furnished for use in other mills of the same purchaser.

Hotwell Pumps

The C. H. Wheeler Manufacturing Company furnished two—C. H. Wheeler Single Stage Hotwell Pumps, double suction type, with horizontally split cases. These pumps were complete with baseplate and flexible coupling for direct connection to motors of the splash-proof type.

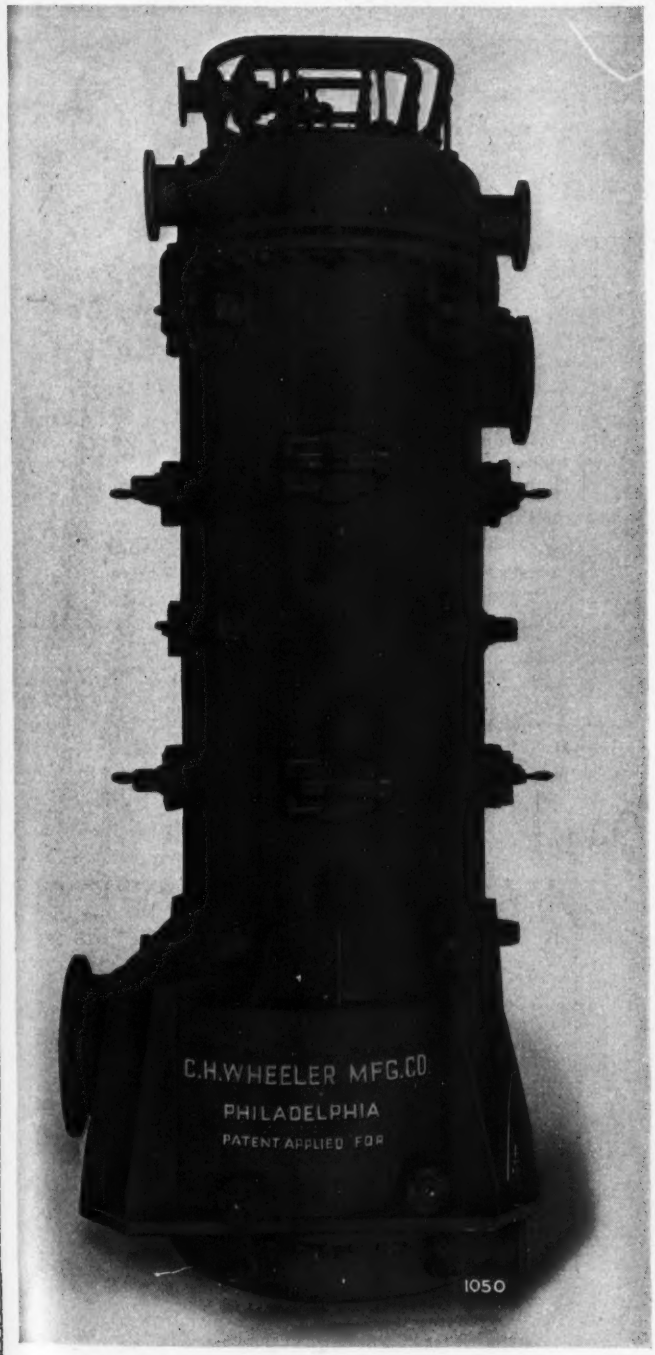
These units were similar to those previously furnished for use in other mills of the same purchaser.

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS

DIGESTER BLOW CONDENSERS

by C. H. WHEELER MFG. CO., PHILA. PENNA.



The tremendous amount of heat available in the Digester Blow justifies, over a short period of time, the installation of the best equipment possible for recovery of this heat.

The unit shown is capable of recovery at the rate of 70,000,000 BTU per hour, it is designed and constructed in such a manner that it can be kept clean and in efficient operating condition with a minimum of trouble and expense.

Construction is rugged and substantial, no effort has been made to cheapen the unit at the expense of continuous satisfactory operation.

All parts are readily accessible for cleaning, inspection or repair.

With this unit the process water being heated is not contaminated by the pulp carryover, the condensed steam is separate from the process water and heat recovery is taking place under the most ideal conditions; i.e., from condensing steam to water.

C. H. WHEELER OF PHILADELPHIA

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS

Machine Has Modern Suction Rolls

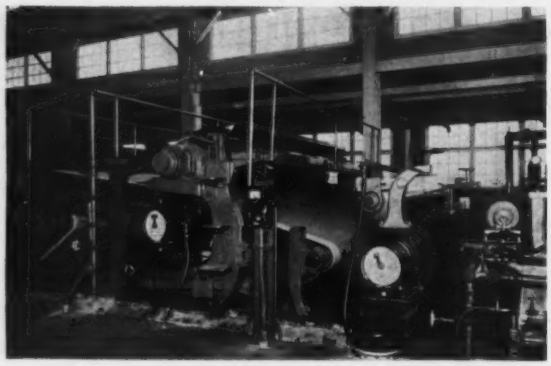


FIG. 1.

The oldest manufacturer of Modern Suction Rolls completely equipped the new machine at the Pasadena (Texas) Mill of the Champion Paper and Fibre Company. The Downingtown Suction Couch Roll of the Cantilever type (Fig. 2) is 30" in diameter by 168" face. Note in the photograph Fig. 1 that the suction piping rises from the floor and that a permanent connection to the roll extends over the sill plate. Suction passes to the roll through duraluminum block, which is removable for changing wires.

Downingtown Patented Suction Felt Rolls (Fig. 3) maintain the full width of the First and Second Press Felts uniformly clean and open at all times. These two rolls are 16" in diameter by 168" face and since they are located outside the felt, they are not removed in changing felts. Note the sharp, clearly defined line of suction extending straight across the felt in Fig. 3. The two nuts in the center of the end of the roll, next to the vacuum gauge, permit "in" and "out" adjustment of both front and rear deckles, while the single set screw on the side of the front end housing (in line with the suction line across the roll) provides angular adjustment of the suction box.

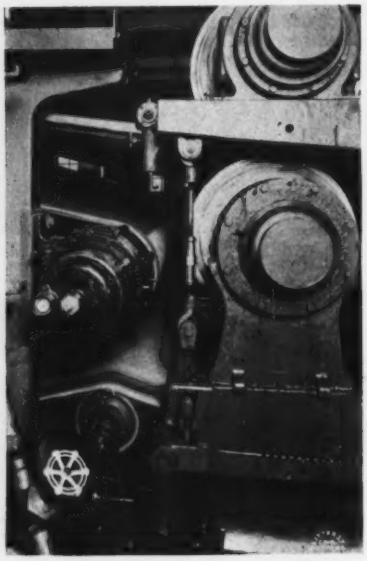


FIG. 3.

Note in Fig. 4 that the Downingtown Suction Felt Roll is installed with a 90 degree felt wrap and that a shower is located a short distance ahead of the nip. The dotted area in the bottom section of Fig. 4 indicates the suction box which extends entirely across the drilled face of the roll.

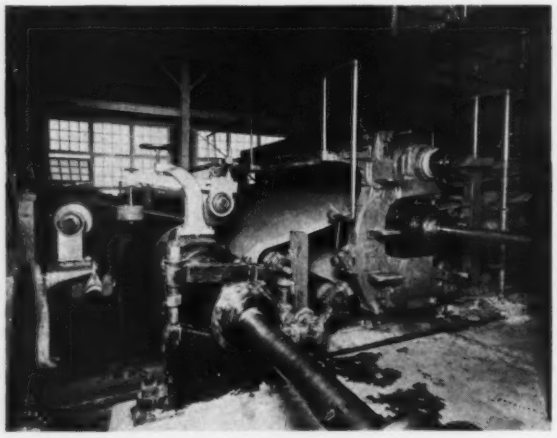


FIG. 2.

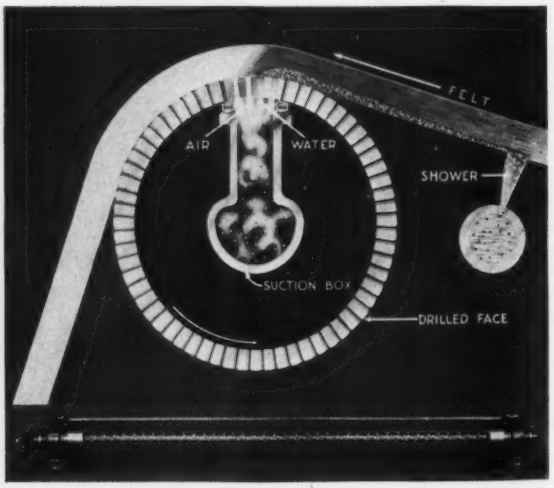
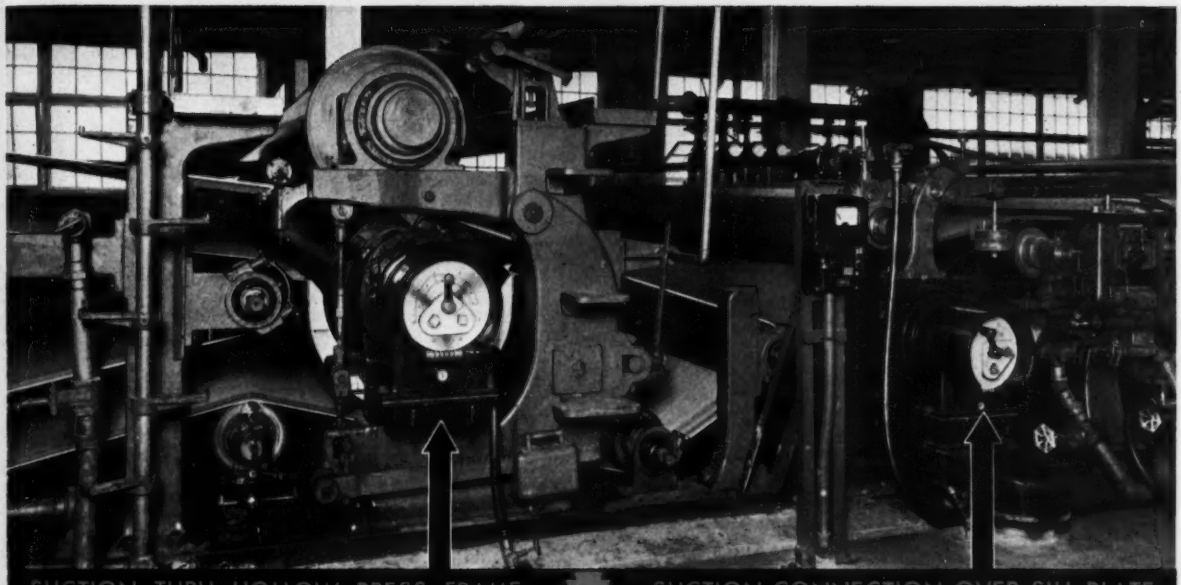


FIG. 4.

THE CHAMPION PAPER & FIBRE COMPANY

NEW MILL AT HOUSTON TEXAS

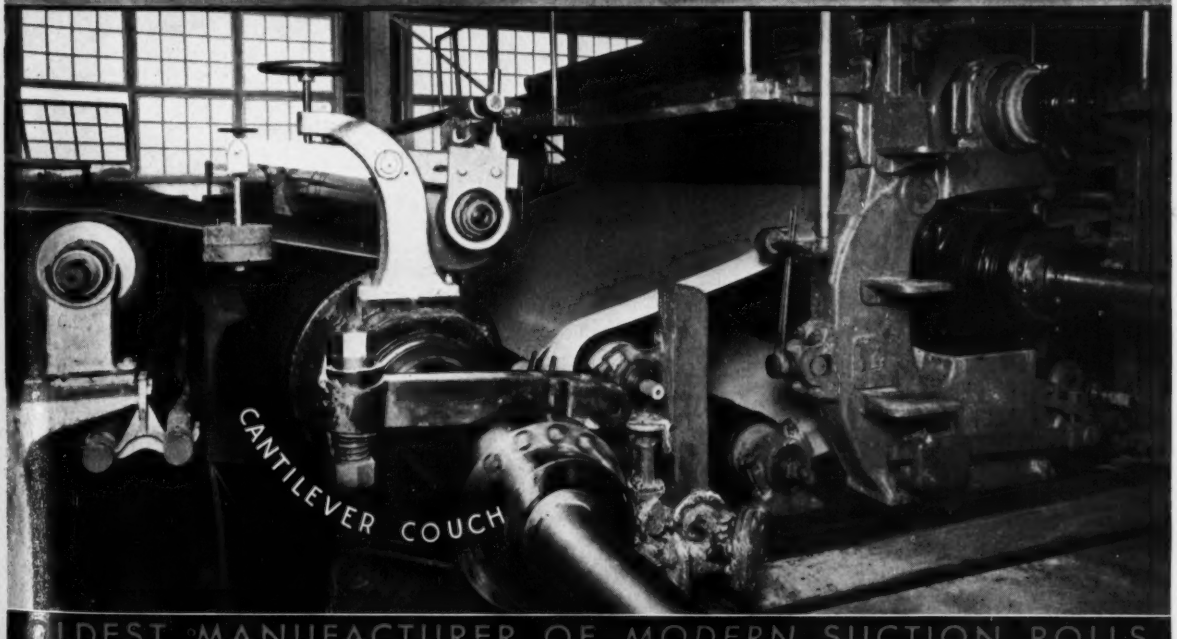
DOWNINGTOWN



SUCTION THRU HOLLOW PRESS FRAME — SUCTION CONNECTION OVER SILL PLATE

REMEMBERED & YET FORGOTTEN

Whenever we inquire about Downingtown Suction Rolls that have been running long enough for the newness to have worn off, we invariably learn that they are among that select group of equipment that is soon forgotten in the mill. This, of course, is because they are so reliable that they seldom need attention. However, it seems they are never forgotten by the upstairs force, who are figuring how fast or how many times they have paid for themselves. If you have not read our new Bulletin No. 117 describing these modern Suction Couch and Press Rolls, write us today. The Downingtown Mfg. Co., Downingtown, Pa.



OLDEST MANUFACTURER OF MODERN SUCTION ROLLS

THE CHAMPION PAPER & FIBRE COMPANY
NEW MILL AT HOUSTON TEXAS

Pumps and Washers

The kraft brown stock, after being blown from the digesters, is washed on Oliver Young Vacuum Washers installed according to Oliver United Filters, Inc.'s two stage system.

This system provides higher gravity liquor for the evaporators and lower salt cake loss in the washed stock than ever before obtained by any other washing method on high resin southern pine wood.

Foam is conspicuous only because of its almost total absence from this system.

The bleached pulp is washed finally on a rubber covered Oliver Young Washer before it goes to the pulp drying machine.

The lime mud in the continuous causticizing system is recovered and washed on two Oliver Lime Mud Filters arranged in series.

In the E. B. Electrobleaching plant a Dorrco Continuous Vacuum Filter built of niclad steel is used for recovering the salt crystals from the caustic solution.

Olivite Acid Handling Centrifugal Pumps are used for pumping the chlorinated water.

Paper Mill Superintendents Meet

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., March 22, 1937—The March meeting of the Michigan Division of the American Pulp and Paper Mill Superintendents Association was held at the Park American Hotel, Thursday evening, March 18. An unusually large number was present, this fact being a compliment to the three National officers who were guests of honor—National president, Frank J. Timmerman, of Green Bay, Wis.; National secretary and treasurer, Robert L. Eminger and field secretary, G. W. Cragie.

The routine business was taken care of and several discussions on various subjects. Following, each of the National officers gave short addresses pertaining to the good of the association and in reference to the approaching National Convention in Springfield, Mass., in June.

Among the many present, the following were noted: F. J. Timmerman, Robert L. Eminger and G. W. Cragie, National officers; Otto F. Fischer, state chairman; Norman J. Cowie, secretary-treasury; F. L. Zellers, French Paper Company; M. J. Redmond, James A. Wise, Kalamazoo Paper Company; H. E. Stafford, E. M. Cowling, Carl C. Schneider, Hawthorne Paper Company; William Clements, George Hendricks, Wausau Paper Company; Robert B. Stewart, L. H. LaLiberte, Kalamazoo Vegetable Parchment Company; John L. Russell, Bryant Paper Company; Glen Sutton, Al Sherwood, Sutherland Paper Company; A. E. Hays, Ray L. Barton, Michigan Paper Company; Harry C. Bradford, A. W. Cole, Rex Paper Company; G. H. Rentrop, Harold A. Smyth, Westinghouse Electric and Manufacturing Company; W. C. Hurley, Waterbury Felt Company; E. W. Cole, Bagley and Sewall Company; W. S. Taylor, American Cyanamid Chemical Corporation; R. P. Smith, Stein Hall Manufacturing Company; R. R. Buss, Paper Makers Chemical Corporation; Lawrence Lynn, R. T. Vanderbilt Company; W. P. Burleigh, Bird Machine Company; E. H. Barnes; W. W. Shaw, H. M. Eastman, Leo A. Willoughby, William H. Astte, M. S. Fogerty, B. Smith, F. C. Boyd, C. Bartholomew, Barney Benson, F. G. Crane, H. G. Potts, Thomas Toovey.

Boston Reports Good Paper Demand

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., March 22, 1937—A general demand for paper prevailed in this market last week, as for some time. The same situation in regard to prices and deliveries existed. In the fine paper division printers were anxious to secure supplies as soon as possible to forestall the possibility of a scarcity in the event of labor troubles at the mills. The business in diploma papers continued good, with dealers very busy. Wrapping paper was in good call, and with the trade keen to obtain stocks.

Some firms have been receiving inquiries from consumers who have never been customers, because of the delivery situation and the feeling that strikes may occur at the mills, but these firms have been in many cases, at least, unable to accommodate such users of paper, because they must take care of their regular customers first.

The box board business continued good.

The paper stock market, as a whole, was very firm, with an advancing tendency. Those stocks which can be used as substitutes for kraft pulp and sulphite pulp were particularly sought. In most grades, at least, there is no surplus stock on hand. In old papers, there was more demand for print manila, which advanced to .75 @ .85 from .65 @ .75, f.o.b. Boston. There was, likewise, an increased call for foreign manila rope, which went up to 4.50 @ 4.90 from 4.25 @ 4.50, f.o.b. Boston. New and domestic rags remained unchanged in price. In old domestic rags, the price of roofing stock was maintained, although mills were loath to place any more orders for a while. In foreign rags, dark cottons were marked down to 2.15 @ 2.25 from 2.20 @ 2.30, f.o.b., Boston. There was not so much demand for them and apparently, it was said, the market was flooded with them.

Orders for twine were plentiful, with goods scarce. In some cases, deliveries cannot be made until four months from now.

Boston Paper Industry Notes

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., March 22, 1937—A special meeting of the S. D. Warren Company is to be held March 26 to vote on authorizing an issue of $2,500,000 of mortgage bonds and $2,500,000 of convertible debentures, proceeds from the sale of which are to refund the company's present bonded indebtedness.

There are outstanding $3,734,000 first mortgage sinking fund gold 6s of 1945 which are currently redeemable at 104. The company will also pay off $359,715 deposits of stockholders and others with the company, and will increase its working capital as a result of the financing.

William P. Libby, traffic manager of the Plymouth Cordage Company, North Plymouth, Mass., was re-elected to the governing board of the Maritime Association of the Boston Chamber of Commerce at the annual meeting of the association March 19.

The Plymouth Cordage Company occupied a booth at the recent New England Hardware Exhibition held at the Hotel Statler in connection with the 44th Annual Convention of the New England Hardware Dealers Association. Products of the company were displayed.

Archer H. Fownes, owner of the Fownes Manufacturing Company, paper box manufacturer, Rochester, N. H., is expected to return today from a three months sojourn in Florida, during which time he passed a week in Stuart with Chester Claff, of M. B. Claff & Sons, Inc., paper box manufacturers, Brockton and Randolph, Mass. Both Mr. Fownes and Mr. Claff are well known in the Boston trade.

U. K. Paper Industry Prospers

WASHINGTON, D. C., March 24, 1937—The year 1936 was one of prosperity for the paper-making industry in the United Kingdom. The general trend of business activity was upward throughout the twelve months and this was naturally reflected in a similar movement of the demand curve for paper. Schemes of paper plant expansion carried out and announced during the year 1936 were numerous, and company reports generally satisfactory.

Imports of finished products, paper and board, rose by 13.2 per cent and this fact coupled with the indicated increase in home production (imports of pulp were 7.4 per cent higher than in 1935) makes it evident that there was a decidedly large increase in consumption. In fact, trade reports all indicate that total sales of every grade of paper were higher than ever before. Particularly noteworthy was the progress made by the Kraft section of the trade during the year. There was an outstanding increase in imports of newsprint, which amounted to nearly 45,000 tons more than in 1935.

PAPER TRADE JOURNAL

ESTABLISHED 1872

Reg. U. S. Pat. Off.

George S. Macdonald, Pres. *Joseph P. Horgan, Secy.*

Executive and Editorial Offices, 15 West 47th St., New York, N. Y.

Henry J. Berger, *EDITOR*
Herbert J. Laughton, *Associate Editor*
Ronald G. Macdonald, *Editor Technical Section*
Lynne M. Lamm, *Washington Correspondent*

Price, Per Copy, 10 Cents — United States, Per Annum, $4.00
Canada and Foreign Countries in Postal Union, $6.00

Member Audit Bureau of Circulations

Vol. CIV New York, March 25, 1937 No. 12

COMING EVENTS IN THE PAPER INDUSTRY

NEW ENGLAND SECTION, Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION, Technical Association of the Pulp and Paper Industry—Fourth Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Annual Meeting, Springfield, Mass., June 23-25.

PAPER AND PULP INDUSTRY SHOWS BIG EXPANSION IN THE SOUTH

With construction of and planning of numerous paper and pulp mills valued at approximately seventy million dollars being pushed in eight Southern states, the prevailing trend of the industry is to that section of the country, this movement following in many respects the trek of the cotton manufacturing industry to the South many years ago.

Another section of this current issue of the PAPER TRADE JOURNAL is devoted to the new mill of the Champion Coated and Fibre Company at Pasadena, near Houston, Texas. This plant is ready to operate and is planned to produce from 175 to 200 tons of bleached sulphate pulp per day, with the view of supplying the Champion mills at Hamilton, Ohio, with pulp for the making of white paper. Paper making units may be added to the Houston mill, when needed.

The recent announcement of the forthcoming erection of a 150-ton newsprint paper mill by the Southland Paper Mills, Inc., in East Texas, has aroused intense interest in the paper industry and the experiment of successfully making newsprint paper from southern pine will be followed with great diligence by manufacturers and other technical experts of the profession. This plant, of course, will be the first newsprint paper mill in the South.

In this connection, the announcement last Saturday by Mr. R. J. Cullen, president of the International Paper Company, that $50 would be the base price for newsprint paper for the first six months of 1938 for delivery at New York, other Eastern and Great Lake and Gulf Coast ports, an increase of $7.50 per ton over the current quotation, will afford great encouragement to the newsprint paper industry.

International also announced last week the placing of an order for two especially designed, high-speed, wide Beloit Fourdrinier machines for a new paper mill to be built in the South, having a capacity of 220,000 tons of kraft board per year. It is expected that the new mill will be in operation before the middle of next year.

Mr. Cullen also announced last week that Southern Kraft Corporation's No. 7 mill, now under construction at Georgetown, S. C., will be in full operation by October, 1937 and producing at the rate of more than 200,000 tons of kraft board per year.

At Savannah, Ga., the first unit of the Union Bag and Paper Corporation's new plant is completed and manufacturing operations have already started. Construction of a second unit is under way and plans for a third unit are being made.

At Charlestown, S. C., the mill of the West Virginia Pulp and Paper Company is nearing completion and manufacturing operations should start within the next few months.

Other plants are either being built or are projected for the Container Corporation of America at Fernandina, Fla.; the St. Joe Paper Company, at Port St. Joe, Fla.; The Brunswick Pulp and Paper Company, at Brunswick, Ga.; the Chesapeake-Camp Corporation, at Franklin, Va., and the Kieckhefer Container Corporation, at Plymouth, N. C.

At the present time paper and pulp mills valued at approximately $80,000,000 are already in operation in the Southern states.

From the foregoing concise description of the development of pulp and paper manufacturing in the South it will readily be seen that the outlook for this sunny section of the country is exceptionally promising for the paper and pulp industry.

CHEMICAL INDUSTRIES EXPOSITION

The Sixteenth Exposition of Chemical Industries will be held in the Grand Central Palace, New York, from December 6 to 11 inclusive. Three floors of the Grand Central Palace have been reserved and advance leasing to date indicates that the 1937 exposition will be one of the largest in recent years.

Design and preparation of the more extensive exhibits is carried forward during a period of from eight to ten months in advance of exposition week, and companies leasing the smaller exhibition spaces have been anxious to make their contracts well in advance in an effort to secure their particular preference in location, with respect to floors, aisles, corners and entrances.

Indications at this early date point to an exposition in which the role of chemical industries in the great reconstruction period now under way will be emphasized through

the medium of dynamic displays designed to show the coordination of each phase of chemical manufacture with the many industries to which it is related.

A feature of the Sixteenth Exposition will be a prize competition for a slogan typifying the role of chemical industries in modern life. The slogan will be expected to represent accurately the purpose of the chemical industries and the benefits accruing to mankind from their activities.

The Sixteenth Exposition will be under the direction of the International Exposition Company, who will have charge of all matters pertaining to leasing and exhibit arrangement. Mr. Charles F. Roth, who has been similarly responsible for all of the previous expositions, will again be personally in charge.

Second Report of the Pulp Evaluation Committee

The Secretary of the Technical Section of the Paper Makers' Association of Great Britain and Ireland, in commenting favorably upon the review of that body's very useful "Second Report of the Pulp Evaluation Committee", as published in the Paper Trade Journal of November 19, 1936, has drawn our attention to the fact that in Great Britain, the manufacturers of the apparatus, as well as offering the impressive new tackle for raising the heavy cast iron lid of the press, also offer a light aluminum press lid, without the hoisting mechanism, as a substitute and at the same price. The aluminum lid is standard for equipment built in the United States and Canada. Prospective users abroad must feel relieved that a set of this very excellent equipment can be purchased in Great Britain, which has the sole right of distributing the apparatus to users outside these two countries, without having to face present preferred British design for the press lid.

It is believed that by now, over a hundred sets of this equipment are distributed and in use throughout the world and, after a number of exhaustive tests by various bodies, the consensus is that the apparatus and method comprise the most perfect means available of forming test sheets from pulp. The equipment is the TAPPI tentative standard and the official standard of the Technical Section of the C.P.P.A.

Box Board Thicknesses

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., March 24, 1937—The Division of Simplified Practice of the National Bureau of Standards has announced that printed copies of Simplified Practice Recommendation R44-36, Box Board Thicknesses, are now available. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents each.

The original recommendation, which became effective October 1, 1925, established gauge lists or thicknesses of the various kinds of paperboard used in the manufacture of paper boxes. The present edition is based on the current standards of the National Paperboard Association, and applies essentially to changes in the thickness of various kinds of box board to meet present needs. Definitions have been added for completeness.

This recommendation is effective from December 31, 1936, and is subject to regular review by a standing committee of the industry.

Production Ratio Report

The following statistics are pased upon paper production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES

Months	1937	1936	1935	1934
January	90.3% (c)	76.1%	65.8%	.....
February	89.8% (c)	77.9%	70.0%	.....
March	.....	76.0%	70.5%	.....
April	.....	82.3%	70.0%	.....
May	.....	81.6%	69.4%	.....
June	.....	80.7%	72.3%	.....
July	.....	77.3%	64.9%	.....
August	.....	81.5%	70.9%	.....
September	.....	80.5%	71.9%	58.2%
October	.....	87.6%	75.6%	64.7%
November	.....	88.0%	75.3%	61.7%
December	.....	85.9%	71.2%	59.6%
Year Average	.....	81.3%	70.5%	.....
Year to Date—First 10 weeks	89.7% (c)	77.2%	67.9%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1937		CORRESPONDING WEEKS, 1936	
*March 6	87.5% (c)	March 7	79.4%
*March 13	88.9% (c)	March 14	78.5%

The following statistics show the number of mills reporting by ratio groups:

Ratio Limits	Number of Mills Reporting, Current Weeks: March 6, 1937	March 13, 1937
0% to 50%	41	26
51% to 100%	262	190
Total Mills Reporting	303	216

* Subject to revision until all reports are received.

(c) Basic capacity data have been adjusted to correspond with ratings reported on January 4, 1937 Machine Improvement Survey.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours," were as follows:

Months	1937	1936	1935	1934	Months	1937	1936	1935	1934
Jan.	78%	61%	61%	....	July	....	69%	59%	....
Feb.	....	67%	67%	....	Aug.	....	75%	65%	....
March	....	68%	67%	....	Sept.	....	76%	69%	62%
April	....	70%	61%	....	Oct.	....	82%	76%	63%
May	....	68%	61%	....	Nov.	....	79%	70%	56%
June	....	68%	65%	....	Dec.	....	74%	60%	52%

Week ending Feb. 6, 1937—86%
Week ending Feb. 13, 1937—86%
Week ending Feb. 20, 1937—85%
Week ending Feb. 27, 1937—86%
Week ending March 6, 1937—86%
Week ending March 13, 1937—84%

February Newsprint Statistics

The News Print Service Bureau reports that production in Canada during February 1937 amounted to 275,532 tons and shipments to 251,256 tons. Production in the United States was 72,072 tons and shipments 74,824 tons, making a total United States and Canadian newsprint production of 347,604 tons and shipments of 326,080 tons. During February, 28,110 tons of newsprint were made in Newfoundland, so that the total North American production for the month amounted to 375,714 tons. Total production in February 1936 was 317,612 tons.

The Canadian mills produced 113,378 tons more in the first two months of 1937 than in the first two months of 1936, which was an increase of twenty-five and two tenths per cent. The output in the United States was practically the same as for the first two months of 1936; in Newfoundland 7,376 tons or fourteen and six tenths per cent more, making a net increase of 120,603 tons, or eighteen and five tenths per cent.

Stocks of newsprint paper at Canadian mills were reported at 73,769 tons at the end of February and 15,995 tons at United States mills, making a combined total of 89,764 tons compared with 68,240 tons on January 31, 1937. Considerable tonnage was accumulated at points from which water shipments will be made upon the opening of navigation.

PROFITS RIDE ON THE WINGS of PROGRESS

Improved Method of Making

CASEIN

Casein making was formerly an art in that the "feel" of the curd was the most important control of quality.

Now, by the application of heat and pH control, together with modern equipment, Cyanamid has eliminated the guesswork and made possible the manufacture of more uniformly high quality Casein. Speed in processing is essential in securing this uniform high quality. At Cyanamid it is now a matter of minutes from milk to Casein bagged for shipment.

It is through the development of such methods that Cyanamid is helping its customers to keep quality up and the costs down. Cyanamid's comprehensive list of products for paper production, together with the cooperation of our experienced technical staff and the benefits of our speedy delivery system, will give you added confidence in the success of your production methods.

American Cyanamid & Chemical Corporation

30 ROCKEFELLER PLAZA • NEW YORK, N. Y.

Section of the
Technical Association of the Pulp and Paper Industry
Edited by Ronald G. Macdonald, Secretary

Delaware Valley TAPPI Discusses Cellulose

The Delaware Valley Section of the Technical Association of the Pulp and Paper Industry met at the Engineers Club, Philadelphia, Friday evening, March 19. H. C. Schwalbe presided as chairman.

Charles H. Champion, former president of the Superintendent's Association made a few remarks.

Chairman Schwalbe appointed the following as a nominating committee:—W. M. Shoemaker, Chairman, Edward J. Albert and George Martin.

Dr. Schwalbe introduced Miss R. M. Cobb as chairman of the technical program of the meeting.

The speaker of the evening was Dr. E. O. Kraemer of the Research Department of E. I. du Pont de Nemours, Wilmington, Del., who talked on "Molecular Structure of Cellulose and Its Significance for the Paper Industry."

Following are some of the interesting comments made by Dr. Kraemer:—

One of the most significant findings in the last decade was the discovery that the difference in viscosity of various celluloses is a measure of the molecule chain length.

There are several ways of determining the molecular weight of cellulose and other compounds. These are first, by so-called end of chain determinations which are unsatisfactory, and second, by study of the properties of cellulose in solution. In the latter case the following procedures are known: 1. diffusion (unsatisfactory); 2. Osmotic pressure (this works out well in certain cases where it is possible to use a satisfactory membrane; 3. viscosity (an indirect method can be used successfully but it is very much involved); 4. ultracentrifuge (this is the best procedure and ultracentrifuges are now available that make the method practical).

In the use of the ultracentrifuge the degree of settling of the cellulose molecules is a measure of their molecular weight. This is called the sedimentation equilibrium procedure. Centrifuges used for this purpose revolve at a rate of 12,000 r.p.m.

When a centrifuge capable of revolving at a rate of 60,000 r. p.m. is used, it is possible to observe the rate of settling of the molecules and their tendency to diffuse back. This method is called the sedimentation velocity and diffusion process.

The sedimentation equilibrium procedures is based on the fact that big molecules will settle faster than small ones and is therefore a measure of the length of the molecular chain.

The sedimentation velocity and diffusion method is a measure of the homogeneity of the solution.

The molecular weight is a linear function of its intrinsic viscosity.

Following are some interesting figures supplied by Dr. Kraemer. They relate to cotton cellulose. (Figures for wood pulp can roughly be considered about 90 per cent of the following) and are the molecular weights of representative materials.

	M.W.	Degree of Polymerization *
Natural cellulose	About 50,000	About 3,500
Regenerated cellulose (viscose)	50,000–120,000	300–700
Bacterial cellulose	200,000	1,300
Farr and Eckerson hydro-cellulose by acid treatment	40,000	200
Dynamite nitrocellulose	750,000–875,000	3,000–3,500
Plastic nitrocellulose	125,000–150,000	500–600
½ sec. nitrocellulose	45,000	175
Cellulose acetate	45,000–100,000	175–360

* Number of glucose residues in the molecule.

Those Who Attended

Among those present were: C. M. Connor and L. Justice, Valley Forge Laboratories, W. Conshohocken, Pa.; Charles H. Pritham, Frankford Arsenal, Philadelphia; J. D. Davis, J. R. Atwater and H. C. Schwalbe; Dill & Collions, Inc., G. L. Schwartz, du Pont Experimental Station, Wilmington, Del.; F. L. Stiegler and Wm. M. Shoemaker, National Vulcanized Fibre Company; Yorklyn, Del.; W. T. Mayer, E. Putnam Head and A. H. Stanton, Mason-Neilan Regulator Company, Boston, Mass.

Charles Champion, Millers Falls Paper Company Millers Falls, Mass.; Edward A. Shallcross, Sr., Philadelphia, Pa; J. H. Brougham, Penn Fibreboard Corporation, York, Pa.; M. Craig Maxwell, McDowell Paper Mills; R. E. Bare, Elk Paper Manufacturing Company, Childs, Md.; C. G. Albert, Edgar Bros. Company, Metuchen, N. J.; George B. Martin, General Dyestuff Corp., Philadelphia, Pa.; Harry B. Davies, Henry B. Davies Co., Camden, N. J.

Miss R. M. Cobb, Lowe Paper Company, Ridgefield, N. J.; F. E. Winslow, General Electric Company, Philadelphia, Pa.; Frank W. Varden, The Barber Company, Inc., Philadelphia; H. L. Becher, Agasote Millboard Company, Trenton; George J. Lane, Edgar Brothers Company, Metuchen, N. J.; James H. Fritz, National Oil Products Company, Harrison, N. J.; J. Jacobsen, National Aniline and Chemical Co., Philadelphia; J. Edge, Downingtown, Manufacturing Company; S. Reynolds, Container Corporation of America; E. R. Feicht, F. G. Barber, Paul V. Barrow, B. M. Thomas, John F. Halladay, and T. P. Field, Container Corporation of America, Philadelphia.

Ralph Mair, Krebs Pigment and Color Corporation, Newport, Del.; Robert W. Ball, Krebs Pigment and Color Corporation; Ralph W. Shaffer and A. W. Wickham, MacAndrews & Forbes Co., Camden, N. J.; Earl F. Anderton, F. W. Brainerd, and Paul Hodges, Scott Paper Company, Chester, Pa.; J. Roslund, Charles Schwartzkopf and Frank F. Schrier, The Moore & White Company; R. G. Macdonald, TAPPI, New York.

Instrumentation Studies. IX

The Bekk and Gurley Smoothness Testers

By The Staff of The Institute of Paper Chemistry

The Bekk smoothness tester consists of a mercury manometer connected by a three-way valve to a vacuum pump, a glass anvil, and the atmosphere. The anvil, where the sample is mounted, is made of optically flat plate glass, in the center of which is a tapered hole, having a diameter of 11 mm. at the top and 1 mm. at the bottom. The area of the anvil is 10 sq. cm. Between the manometer and the valve is a chamber in which the pressure is reduced by means of the vacuum pump when the valve is in the proper position. The manometer shows the difference between the pressure in the chamber and atmospheric pressure in millimeters of mercury. The readings, therefore, are *not affected by the atmospheric pressure.* Two chambers are provided to cover different ranges. The purpose of these will be described later.

With the air chamber at reduced pressure, the valve is turned to the position connecting the anvil with the manometer and air chamber. Now a pressure differential exists between the opening at the center of the anvil and the outer edge and if a paper is held on this surface, air will flow in at a rate depending upon the roughness of the paper surface and the pressure difference. In operation an average pressure difference of 370 mm. of mercury (0.5 atmosphere) is used. The pressure on the paper is 1 kg. per sq. cm. and the air chamber is so designed that a flow of 10 cc. of air into it will cause a drop in pressure of 20 mm. By definition, the smoothness is then taken as the time for 10 cc. of air to pass between the 10 sq. cm. of polished glass and the paper surface under an average pressure of 370 mm., the paper being subjected to a pressure of 1 kg. per sq. cm.

A smaller air chamber is provided to be used on smooth papers or for porosity measurements. This chamber is of the proper size to allow 1 cc. of air to flow with a pressure drop of 20 mm. Additional marks are provided on the manometer column at 428 and 282 mm. This 200 mm. pressure drop is caused by a flow of 10 cc. of air into the small chamber or of 100 cc. into the large chamber.

Theory

First, let us consider the theory of the air chambers designed for providing a known air space or volume on the low pressure side of the anvil. At a given volume and temperature, the pressure is changed only by changing the mass or density of the air in the low pressure chamber. If P is the pressure in the chamber, v the volume of air admitted at atmospheric pressure, and V the volume of the chamber, then

$$P = \frac{v}{V} \times 740,$$

or

$$P_1 - P_2 = 740 \left(\frac{v_1 - v_2}{V} \right) = 20 \text{ mm.},$$

where P_1 and P_2 are the pressures at the beginning and end of the test interval.

If

$$740 \left(\frac{v_1 - v_2}{V} \right) = 20,$$

and

$$v_1 - v_2 = 10 \text{ cc.},$$

then

$$V = 370 \text{ cc.};$$

similarly, if $v_1 - v_2 = 1.00$ cc.,

$$V = 37.0 \text{ cc.}$$

The small (37 cc.) chamber allows a flow of 1cc. of air for a 20 mm. drop or 10 cc. for 200 mm. drop. The large chamber (370 cc.) allows a flow of 10 cc. and 100 cc. for 20 and 200 mm. drop, respectively.

The rate of drop in pressure difference, as shown by the manometer, is expressed by a logarithmic function. If P_1 and P_2 are any readings in millimeters, T, the time required for such change in pressure, and K, the smoothness factor a constant, then

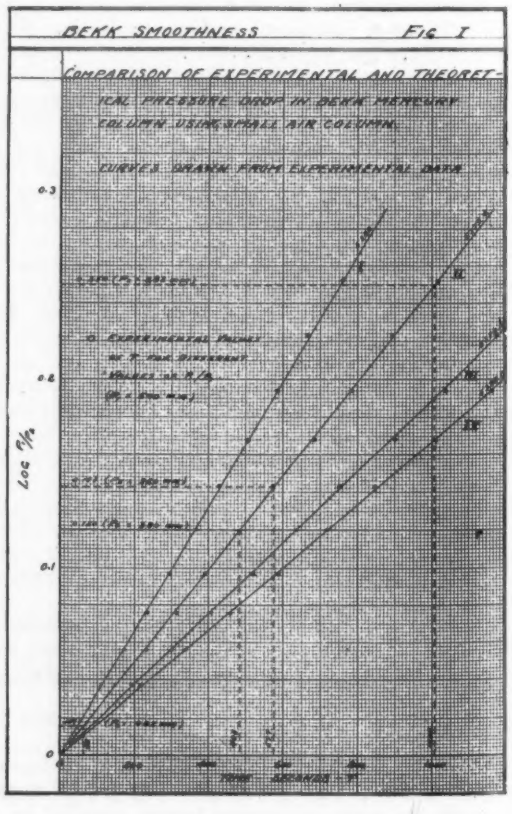
$$\log \frac{P_1}{P_2} = KT;$$

$$\text{if } P_1 = 380 \text{ and } P_2 = 360,$$

$$\log 1.055 = KT = 0.02325,$$

$$\text{or } T = \frac{0.02325}{K},$$

T is arbitrarily called smoothness. If $\log \frac{P_1}{P_2} = KT$ is plotted for different values of P_2 and corresponding values of T, a straight line will result. The slope of this line is K, from which smoothness, T, may be found more accurately than by taking the time T between 380 and 360 mm. Time readings for a series of pressure drops have been taken on four papers (Table I). Fig. 1 shows the curves calculated from this data by the method described above. Taking as an example curve No. II, the measured time for 1 cc. of air (pressure drop of 20 mm. on small chamber) was 91 seconds. The slope of the curve is



$$K = \frac{\log P_1/P_2}{T} = \frac{0.250}{1.008} = 0.248 \times 10^{-3}$$

$$\text{or } T = \frac{.02325}{.000248} = 94.3,$$

While the figure 94.3 is a more accurate measure of the smoothness, such curves cannot be taken on smooth papers due to the time required. A greater accuracy in readings can be expected when reading between the 200 mm. marks.

The location of the 200 mm. marks on the manometer is derived as follows: It is required to locate these marks such that the time (T') is greater by a factor of 10, and also that they are spaced 200 mm., so that the volume of air flowing will be greater by a factor of 10.

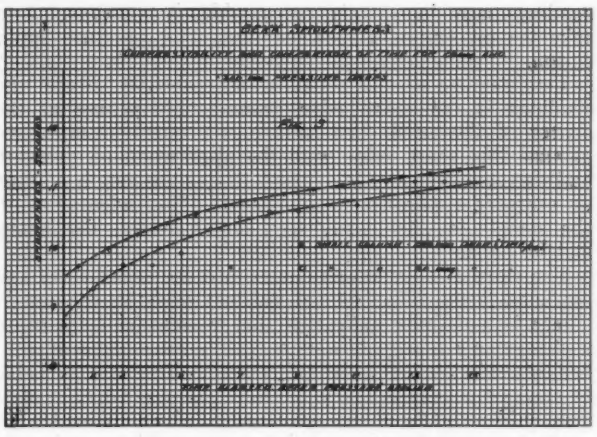
If $P_1 = 380$, $P_2 = 360$, P'_1 and P'_2 are pressures for 200 mm. marks and T' is the time for 200 mm. drop; then

$$\begin{aligned}
T' &= 10\ T; \\
P'_1 - P'_2 &= 200 = 10(P_1 - P_2); \\
\log \frac{P'_1}{P'_2} &= 10 \log \frac{P_1}{P_2}; \\
\frac{P'_1}{P'_2} &= \frac{(P_1)^{10}}{(P_2)}; \\
\frac{200 + P'_2}{P'_2} &= \frac{(P_1)^{10}}{(P_2)}; \\
P'_2 &= \frac{200}{\dfrac{(P_1)^{10}}{(P_2)} - 1}; \\
&= 281.3; \\
\text{and } P'_1 &= 481.3
\end{aligned}$$

The instrument is therefore marked at 282 and 482. The measured time between these marks was 944.0, which, divided by 10, corresponds with 94.3, calculated from 20 mm. drop.

Referring again to Fig 1 a graphical check can be made to check the time for 20 and 200 mm. drops. If the ordinate values of log P_1/P_2 are extended to the curve for pressures of 380 to 360 and 482 to 282, the intercept gives a time of 94 seconds for the 20 mm. drop and 946 seconds for the 200 mm. drop. These values check within the limits of accuracy in reading the graph.

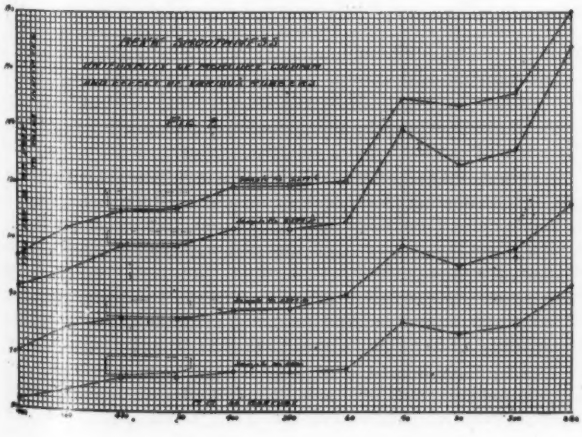
The time required for a 20 mm. drop on the instrument was in most cases less than one-tenth of the time required for a 200 mm. drop. This is evidently due to the rough condition of the mercury column. Fig. 2 shows this non-uniform drop of the mercury. The time required for a 20 mm. drop is plotted for pressures from 500 to 280 mm. and shows that the rate of drop is greatly retarded at 340 mm. The unevenness of the curves throughout this range indicates the effect due to non-uniform flow in the mercury column. This effect is further illustrated by Fig. 3, showing that an error of about 4% can

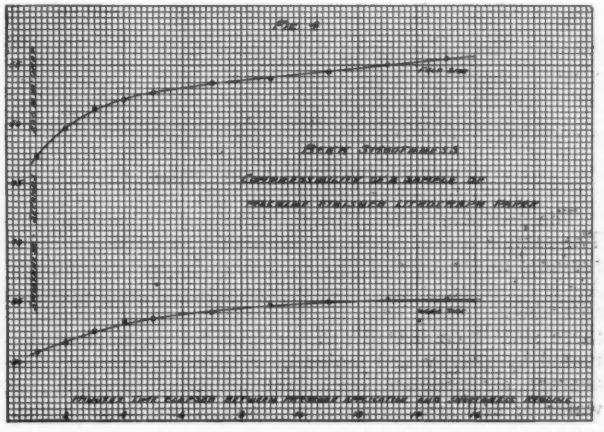


be expected (using the 20 mm. marks), due to the conditions of the column on the instrument tested. The smooth curve of readings taken between the 200 mm. marks is a further proof of greater accuracy of instrument and less error in readings when used with this range.

Considering the instrumental errors there is some justification, however, in using the 20 mm. marks for all readings and changing air chambers for 1 cc. and 10 cc. flow. When comparing a group of papers, the smooth ones may be read with 1 cc. (20 mm. and small chamber), in order that the time required for readings should not be excessive. If, then, a change be made to 10 cc. flow, a change to the large chamber using a 20 mm. drop has been found to give an increase in time by a factor of 10 within very close limits. However, if the small chamber and 200 mm. marks are used the reading will be increased by a greater amount, as previously explained. This condition should not exist if the mercury column was in good condition; in this case it should be recommended that the small chamber be used for all smoothness measurements, and where time permitted, the 200 mm. marks should be used to reduce error in reading.

Another important consideration in the smoothness readings is that of compressibility of samples. The smoothness increases with time of pressure application, becoming nearly constant on most samples after about 15 minutes and changes rapidly during the first 3 minutes (Figs. 3 and 4); the 200 mm. drop was from 482 to 282 mm.; the 20 mm. drop from 380 to 360 mm. The total change may amount to 15 or 20% and the change during the first 3 minutes will be about 10%. Therefore, in order that





readings may be strictly comparable, it is necessary to take the reading at a specified time after pressure application.

One feature of the tester which probably affects the readings is the sharp edge around the opening at the center of the anvil. The sample is probably compressed around this sharp edge with the application of pressure and this seal probably becomes better as the length of time of pressure application is increased. The indentation on the sample is very easily seen on all except the heavy weight papers.

The third feature which enters into the accuracy of the readings is the effect of the rubbers used on the tester. There is a definite indication that various rubbers cause a change in reading; however, with similar types of rubber this effect seems to be quite small. The data in Table II shows the results taken on four samples which varied greatly in weight and surface texture. Three rubbers were used for these tests; one being the rubber ordinarily used for the Bekk tester, the second being a piece cut from a heavy duty automobile inner tube, and the third being a piece of soft Para rubber supplied with the instrument. After averaging the smoothness on all four samples for each rubber it is seen that there is no appreciable difference in the results from the different rubbers. There is of course some variation in the sample but sufficient readings were taken so this variation should have small effect on the average result.

TABLE I—RATE OF PRESSURE DROP IN BEKK MANOMETER

P_o = 500 mm.

P	$\frac{P_o}{P}$	$\log \frac{P_o}{P}$	Seconds 5380 F	5379b F	5379a F	5379c F
480	1.04	.018	53	93	70.2	103.7
460	1.087	.037	110	192	149.3	217.8
440	1.137	.056	172	300	231.7	338.1
420	1.19	.076+	234	407	314.1	459.6
400	1.25	.097+	298	521	390.7	588.7
380	1.317	.120	362	635	485.6	717.7
360	1.39	.143	427	751	576.6	848.0
340	1.47	.168	508	901	684.8	1007.8
320	1.56	.194	586	1038	785.8	1165.3
300	1.67	.223	666	1180	893.3	1329.0
280	1.79	.252	760	1358	1016.4	1520.3

TABLE II—BEKK RUBBER COMPARISON

Sample	Rubber No. 1 (Square) W	Rubber No. 1 (Square) F	Rubber No. 2 (Round) W	Rubber No. 2 (Round) F	Rubber No. 3 (Octagon) W	Rubber No. 3 (Octagon) F	
L 2646	78.2	55.7	83.2	65.8	84.1	70.2	Large Column
	80.1	63.5	91.0	67.2	73.3	60.8	482-282 drop
	78.6	60.0	92.8	59.6	85.1	58.1	482-282 drop
	77.8	63.8	84.2	58.9	80.7	65.2	482-282 drop
Average	78.68	60.75	87.8	62.87	80.8	63.57	
L 29	92.0	117.0	81.7	105.4	82.5	106.4	Small Column
	90.2	113.2	83.6	105.6	85.4	115.0	482-282 drop
	90.4	104.3	90.4	112.0	84.2	119.0	482-282 drop
	95.2	108.5	86.0	113.0	83.2	121.2	482-282 drop
Average	91.95	110.75	85.43	109.0	83.83	115.4	
L 816	52.0	65.9	54.4	65.5	56.4	68.0	482-282 drop
	55.6	63.2	50.0	66.0	54.6	71.5	482-282 drop
	54.0	68.0	54.2	66.1	57.5	69.4	482-282 drop
	55.1	69.2	57.4	63.8	57.4	72.5	482-282 drop
Average	54.18	66.58	54.0	63.35	56.47	70.35	
L 3815	63.0	67.4	56.2	70.5	53.2	68.0	482-282 drop
	61.3	75.8	55.5	69 6	56.8	68.2	482-282 drop
	55.4	76.1	58.8	70.0	54.5	72.9	482-282 drop
	61.6	69.7	56.8	76.2	53.9	75.2	482-282 drop
Average	60.32	72.25	56.83	71.58	54.6	71.08	

The Gurley Smoothness Tester

The principle of the Gurley instrument is quite simple. The sample is held between two highly polished flat metal surfaces under a pressure of one-half lb. per square inch. Air is admitted to each side of the paper through annular slits about 1 mm. wide in the metal surfaces. Each of these slits is connected to a cylinder having a piston actuated by gravity and sealed by a body of mercury. An average air pressure equivalent to about 12 inches of water or 22.4 mm. of mercury results from these pistons. Smoothness is measured by determining the time required for a given volume of air under pressure to escape between the flat surface of the block and the paper surface. Due to the use of two pistons and the application of air under pressure to both sides of the sample sheet, smoothness readings on both sides are obtained simultaneously. The design of the instrument makes the operations of inserting and removing samples, and of taking readings very convenient.

The Gurley tester as received was equipped with metal blocks 15/32 of an inch in diameter with a 6 mm. hole in the center, through which the air under pressure was admitted. In using the instrument with these blocks to measure the smoothness of coated book papers it was found that the average deviation of the results of individual tests was very high, though on rougher papers it was not so serious. The reason for the large deviation on coated book papers was investigated and it was concluded that a small speck or a lump in the sheet had an enormous effect on the magnitude of the reading. Since the paper is held between two metal surfaces, a small lump within the sheet of greater thickness than the sheet itself will hold the blocks from normal contact with the paper over a large area. In the Bekk tester this condition is taken care of by the rubber diaphragm into which the lumps are pressed, allowing the rest of the paper to come in contact with the glass anvil.

Another disadvantage of the Gurley instrument, using the blocks originally supplied, when measuring very smooth papers, was the length of time required for a reading. The time required for a 2.5 cc. flow of air was often in range of 600 seconds.

From the results of the first work with this instrument, it was concluded that the Gurley tester was unsatisfactory for measuring the smoothness of very smooth paper, such as coated book, because of the very erratic readings obtained, though it apparently gave correct results with rougher papers. These findings were discussed with the manufacturer, who had already become aware of the condition existing with smooth papers and had designed a new type of pressure block to overcome the difficulties of erratic results and the long time required. We were supplied with a new set of blocks, which were designed so that the same effective area of metal to paper contact was maintained, but this area was obtained with a much narrower ring of a large diameter. The diameter of the new blocks is 1 23/32 inches. The effective area is still one square inch as in the old type of block and the pressure on the test area duplicates the former as near as it is possible to calculate it.

The new design also overcomes the inconveniences of long test time. The time required for the escape of a given volume of air was reduced to about ⅛ that found with the original blocks.

The Gurley instrument avoids any variation in results due to non-uniform drop of the mercury column, variations in conditions of rubber sealing pad, and compressibility of the paper.

Another characteristic of the Gurley instrument which may be of interest in its operation is the effect of buoyancy of the mercury on the pistons. While this effect is small, it is still real and increases the smoothness reading as the pistons are lowered. For example, the time required to drop from 25 to 30 cc. marks would be approximately 10% greater than the time required from 0 to 5 cc. marks. Therefore, all readings should start at 0 and stop at some arbitrarily chosen mark for a given group of papers. The 2.5 cc. mark should be used for smooth coated books and supercalendered lithos and the 5 cc. mark for most un-

coated lithos and books. All readings are reported on the basis of 5 cc. air flow. Table III and Fig. 5 show this linearity check.

TABLE III—LINEARITY OF GURLEY TESTER

(Taken on M. F. Litho Paper)

cc.	Time F	Time W
0	0	0
2.5	28	28
5	55	55
10	112	109
15	170	165
20	228	223
25	288	280
30	350	338

Data

The data tabulated cover a large variety of papers read on both the Bekk and Gurley testers. Readings were taken on 14 coated book papers ranging in Bekk smoothness from 350 to 1220 and in Gurley smoothness from 34 to 173. A group of 9 supercalendered lithos ranged Bekk 156 to 960 and Gurley 21 to 122. A group of 8 M. F. lithos ranged Bekk 45 to 143 and Gurley 14.7 to 57.8. A group of 13 special papers, including lithos, uncoated books, and offsets, ranged Bekk 5.7 to 205 and Gurley 0.43 to 72.6. A group of 19 uncoated litho, book, and magazine papers ranged Bekk 29 to 623 and Gurley 2.8 to 86.8.

Twenty-four readings were taken on a sample of coated book paper on both the Gurley and Bekk testers to show deviation from average value. The Gurley showed an average deviation of 18%, with a maximum deviation of 41% plus and minus, while the Bekk showed an average deviation of 8% and a maximum of 21% plus and minus. These results are tabulated in Table IV. The deviation on the Gurley is much less for uncoated lithos, book papers, and newsprint, although in all cases it was greater than on the Bekk.

All Bekk smoothness values are reported on the basis of 10 cc. flow or a 20 mm. drop, using the large air chamber, and 200 mm. drop, using the small chamber. Gurley smoothness is reported on the basis of a 5 cc. air flow. A rough correlation is seen between papers within the same general group. Evidently a better correlation could be made between the two instruments if a large number of Gurley readings could be taken on each sample. The correlation is not close enough for comparison curves but in general it is seen that the ratio of Bekk to Gurley readings varies from 2 to 5 for uncoated papers, 3 to 9 on supercalendered papers, and 5 to 18 on coated book papers.

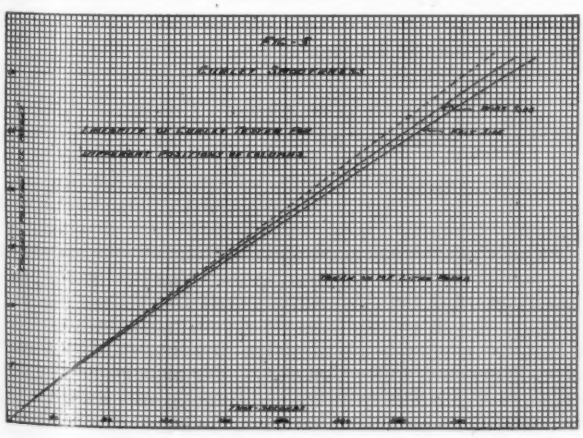


TABLE IV—DEVIATION FROM AVERAGE VALUE

Piece No.	Gurley (2.5 cc.) Seconds W	Gurley (2.5 cc.) Deviation	Gurley (2.5 cc.) Seconds F	Gurley (2.5 cc.) Deviation	Bekk (10 cc.) Seconds W	Bekk (10 cc.) Deviation	Bekk (10 cc.) Seconds F	Bekk (10 cc.) Deviation
1	40	+ 7.4	40	+ 8.8	580	—104	575	— 45
	30	— 2.6	43	+11.8	641	— 43	592	— 28
	20	—12.5	37.5	+ 5.3	665	— 19	603	— 17
2	33	+ .4	33	+ 1.8	625	— 59	590	— 30
	31.5	— 1.1	35.2	+ 4.0	650	— 34	554	— 66
	27.5	— 5.1	19	—12.2	630	— 54	563	— 57
3	25	— 7.6	29	— 2.2	660	— 24	525	— 95
	20	—12.6	23	— 8.2	640	— 44	548	— 72
	25	— 7.6	34	— 2.8	673	— 11	568	— 62
4	33	+ .4	22	— 9.2	613	— 71	496	—124
	38.5	+ 5.9	21	—10.2	646	— 38	545	— 75
	43.5	+10.9	31	— .2	674	— 10	582	— 38
5	34	+ 1.4	33	+ 1.8	645	— 39	656	+ 36
	27.5	— 5.1	35.5	+ 4.3	670	— 14	675	+ 55
	32	— .6	27	— 4.2	740	+ 56	720	+100
6	33	+ .4	25	— 6.2	712	+ 28	627	+ 7
	44	+11.4	37	+ 5.8	671	— 13	605	— 15
	49	+16.4	36	+ 4.8	708	+ 24	678	+ 58
7	44	+11.4	42	+10.8	743	+ 59	635	+ 15
	35	+ 2.4	30	— 1.2	752	+ 68	673	+ 53
	33	+ .4	33.5	+ 2.3	780	+ 96	698	+ 78
8	22	—10.6	20	—11.2	787	+103	714	+ 94
	23	— 9.6	31	— .2	754	+ 70	754	+134
	40	+ 7.4	32	+ .8	758	+ 74	701	+ 89
Average	32.6	6.3	31.2	5.43	684	44	620	60

	Average Deviation W	Average Deviation F	Maximum Deviation W		Maximum Deviation F	
Gurley	19.3 %	17.4 %	+50.3%	—38.6%	+37.8%	—39.0%
Bekk	6.42%	9.67%	+15.1%	—15.2%	+21.6%	—20.0%

TABLE V—SMOOTHNESS—14 COATED BOOK SAMPLES

Each figure is the average of six readings.

Sample		Bekk	Gurley	Per Cent Gloss
5376	F	810	79	39.10 F
	W	680	53	
5377	F	810	151	45.34 F
	W	720	97	
5378	F	630	104	38.50 F
	W	560	74	
5379	F	1220	173	56.33 W
	W	1260	120	
5380	F	610	64	42.84 W
	W	580	53	
5381	F	1220	129	59.09 F
	W	1220	100	
5382	F	700	60	53.73 W
	W	650	34	
5383	F	660	80	63.78 W
	W	750	83	
5384	F	350	64	34.24 W
	W	350	48	
5385	F	1180	132	38.88 W
	W	1060	110	
5386	F	710	52	40.15 F
	W	770	81	
5387	F	730	94	53.40 W
	W	920	114	
5388	F	590	85	42.47 F
	W	460	75	
5389	F	530	61	58.59 W
	W	540	66	

TABLE VI.—SMOOTHNESS—M. F. LITHO

Sample		Bekk	Gurley	% Gloss	Thickness	Porosity
10609	F	46	18.0	10.9	.0034	202
	W	34	14.7	11.6		
10610	F	134	43.0	14.3	.00317	158
	W	101	32.0	14.7		
10611	F	79	23.3	15.5	.0025	373
	W	73	16.8	15.8		
10612	F	52	19.8	11.8	.0036	75
	W	45	17.1	12.4		
10613	F	87	32.5	16.6	.00314	159
	W	98	36.7	19.1		
10614	F	121	57.8	14.0	.00313	88
	W	111	54.9	16.6		
10616	F	53	20.3	11.3	.00348	168
	W	56	22.0	14.3		
10617	F	143	46.8	18.3	.0029	179
	W	136	51.4	18.2		

TABLE VII—SMOOTHNESS—SUPERCALENDERED LITHOS

Sample		Bekk Smoothness	Gurley Smoothness	Thickness (Inches)	Porosity (Seconds)
10635	F	193	28.8	.0029	214
	W	156	30.0		
10636	F	320	86.0	.00262	128
	W	306	100.0		
10638	F	303	42.0	.0030	114
	W	373	82.0		
10639	F	250	64.0	.00345	174
	W	243	78.0		
10640	F	791	61.0	.00275	315
	W	689	52.0		
10641	F	236	61.0	.00315	353
	W	370	41.0		
10644	F	342	45.0	.0024	365
	W	330	59.0		
10653	F	169	22.0	.0032	259
	W	175	21.0		
10909	F	960	122.0	.00292	1470

TABLE VIII—SMOOTHNESS—SPECIAL PAPERS

Sample		Bekk	Gurley
14	F	32	15.2
	W	35	15.8
15	F	10	.49
	W	10	.43
104	F	8	2.3
	W	9	1.8
105	F	26	10.9
	W	34	15.2
106	F	32	15.8
	W	31	13.4
a—	F	9	1.8
	W	7	1.6
b—	F	9	1.8
	W	5	1.2
c—	F	34	6.3
	W	32	7.7
d—	F	27	5.7
	W	25	6.5
e—	F	73	25.3
	W	50	16.9
f—	F	35	15.4
	W	35	12.5
g—	F	9	4.0
	W	10	4.5
h—	F	205	72.6
	W	187	60.2

TABLE IX—SMOOTHNESS—BOOK AND MAGAZINE

Sample		Bekk Smoothness	Gurley Smoothness	Thickness (Inches)	Porosity (Seconds)
L 1952	W	29	11.5	.00495	72
	F	35	15.7		
L 816	W	143	30.6	.00318	157
	F	161	34.4		
L 29	W	94	28.8	.0051	98
	F	117	48.8		
L 3815	W	61	22.8	.0064	122
	F	74	30.6		
L 5604	W	81	26.8	.00395	84
	F	117	32.6		
L 5252	W	119	40.8	.0026	187
	F	156	58.6		
L 776	W	42	13.5	.00532	66
	F	46	16.2		
L 6247	W	46	13.4	.0051	54
	F	50	16.8		
M 2206	W	50	17.6	.0043	37
	F	50	18.6		
M 821	W	49	14.9	.00412	93
	F	72	20.8		
L 118	W	299	71.2	.0034	202
	F	341	87.0		
L 2812	W	116	37.0	.00393	136
	F	144	54.2		
M 112	W	623	82.8	.00252	294
	F	468	48.0		
M 127	W	294	86.8	.0039	190
	F	219	67.4		
M 9	W	95	28.4	.0033	113
	F	167	37.6		
L 25	W	81	19.5	.0040	119
	F	101	30.4		
L 750	W	34	9.7	.0045	62
	F	36	13.1		
L 2646	W	81	3.5	.0107	56
	F	80	2.8		
L 1161A	W	64	21.7	.0040	26
	F	62	25.1		

Conclusion

The varying definitions given for paper smoothness make it necessary to define the term before talking specifically of the property measured. According to some definitions it is the actual topography of the sheet under no pressure; according to others, it is the topography when under a given pressure; while still others define it as the variation in caliper of adjacent spots. In the case of visual examination, smoothness is the degree of apparent roughness. Practical evaluation of smoothness can be arrived at only from printing trials of the papers. To establish any instrument as a valid measure of smoothness in terms of use requirement, it would be necessary to correlate results obtained with the instrument on papers of varying roughness with the quality of these papers when printed. Such a correlation has been reported on by Wehmhoff (*Technical Association Papers,* 1935), for a few samples using the Bekk tester; his conclusion is that the results with this instrument do measure smoothness as it affects printing. His data, however, are quite limited.

In the following paper, data are given which indicate that Bekk and Gurley measurements do not correlate very well with smoothness as visually graded. However, there is little evidence to indicate that smoothness evaluated visually correlates with smoothness as it affects printing.

From the results given in this report, it is concluded that the Bekk and Gurley testers do not measure the same properties of a paper sheet. This is evident when an attempt is made to correlate the measurements taken with the two instruments.

The results here given lead one to suspect that the Bekk readings are influenced by transverse porosity and to a greater extent than in the case of the Gurley instrument. The Bekk readings which are high in comparison to the Gurley readings on the same samples were taken on papers having a relatively high porosity. If such a correlation does exist, the difference in the effect of transverse porosity could logically be accounted for by the design of the instrument, since the air pressure at a given rate of air flow is higher in the Bekk than in the Gurley tester.

Manufacture of Pulp and Paper, Vol. III

Volume III of the Manufacture of Pulp and Paper, dealing with the preparation and treatment of wood pulp, is now ready as a third revision, and available through the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd street, New York, N. Y., at $6.50 per copy.

The entire volume was examined critically by well qualified members of TAPPI and the Canadian Technical Section. It is 72 pages larger than the previous volume which was the revision of 1927. It has a total of 834 pages, much of which was rewritten and brought up to date. The sections on soda and sulphate pulps were rewritten and brought together in a single section entitled alkaline pulps.

More than fifty individuals have contributed information such as performance and test data, as well as descriptions of up-to-date machinery and practices.

In his preface, J. N. Stephenson, Editor, points out that in the past ten years tremendous advances have been made in the practice of pulp manufacture, and this revision covers such salient ones as: stacking wood, pressing and drying bark, grinding wood, screening pulp, recovery of heat and acid in sulphite cooking, the use of acid-resisting steel, new furnaces for heat recovery in alkaline-pulp mills —with an important division on heat balance—new refiners for recovery of pulp screenings, much new material on bleaching, additional matter on testing pulps of extra quality and for special purposes. The Section on Properties of Pulpwood has also been thoroughly revised.

T 206 m 35 Reference Standards Available

The Hartman-Leddon Company, 6003 Girard avenue, Philadelphia, Pa., has prepared two mineral oil reference standards for the calibration of viscosity tubes used in TAPPI standard viscosity method T-206 m-35. These reference standards are of approximimately 20 and 50 centipoises with a statement of the actual measurement within a tolerance of error of 0.5 centipoise. These oils are priced reasonably, $4.25 per 32 ounces, f.o.b. Philadelphia. The glycerine-water solutions, mentioned in method T-206, m-35 for calibrating the viscosity tubes, are not particularly satisfactory and the oils should be superior for this purpose.

O. J. Naugthon Joins Champion Force

O. J. Naughton, well known paper maker on the West Coast, is now with the Houston Division of The Champion Paper and Fibre Company. Mr. Naughton recently resigned a position with the California Fruit Wrap Mills, of Pomona, to join the Champion Force.

The Significance of Water*

By Hervey J. Skinner[1]

Abstract

The author points out that more water is used in the pulp and paper industry than any other material and stresses the importance of considering it as one of the raw materials in the industry. The objectionable impurities of water such as color, suspended matter, iron, manganese, and hardness are discussed together with methods for their removal. The necessity of water softening for boiler purposes and sometimes for making up size solution is pointed out and a brief comparison of softening by the lime-soda process and the zeolite process is made. Chlorination for slime prevention and corrective treatment for corrosive waters is also touched upon.

The author stresses the importance of water control pointing out that it is a chemical process and should be under the supervision of a chemical engineer and not left to a plant foreman.

In the old days water was water. Even today many people are of the same opinion. How often we hear of someone who has found a spring or sunk a well on his property and brags about what wonderful water he has. The criterion by which he judges the water is color, clarity and taste. It makes little difference to him whether there is a cesspool, barnyard, or other source of pollution near the well provided the water looks or tastes good. If the surface of the land slopes from the well toward the cesspool, then he is sure the water is good, little realizing that the underlying strata may slope in the opposite direction from the surface. In industry we often find the same point of view.

Not long ago the writer was assured by a New England textile manufacturer that the river water which the latter was using in his processes was entirely suitable for textile purposes, and that if the writer did not believe it, he could look at the river from the office window and see for himself. This particular river happens to be one of the worst polluted streams in New England, and its use without chemical treatment in textile manufacturing should not even be considered. This incident is typical of many similar instances which have come within the author's experience, and illustrates the lack of appreciation by many manufacturers of the importance of conditioning their available water supply for the purposes for which it is to be used.

In earlier times the necessity of water purification was not so vital, but with the pollution of our streams, a wide variety of waste materials detrimental to manufacturing operations have found their way into our water supplies. Furthermore, our present-day competition and the demand for better products have made it necessary to resort to greater refinements in the details of manufacturing than heretofore.

On account of the large amount of water required in pulp and paper making, almost all of the larger mills are located on or near rivers. Some of the smaller mills are able to operate on the water from ponds or lakes and in some instances from springs or wells.

All of these sources are subject to pollution. This is especially true in the case of rivers. Pollution is seldom constant, so that there is a variation in the quality of the water from day to day and oftentimes from hour to hour. Furthermore there is a variation between wet seasons and dry seasons and between summer and winter.

In the early days of paper making, water was used without any treatment. Some mills which are not concerned with color or quality still operate on raw water. As competition became keener, it became necessary to filter the water which eliminated spots caused by suspended matter. Then in order to compete with some mills which had a colorless natural water it became necessary to chemically treat the water to remove the color. Still later it was found that the ever present slime in paper mills was caused by bacteria and chlorination became common practice. With the low pressure steam boiler, mills were able to get along fairly well by using a little soda ash or boiler compound to keep scale down, but with the advent of the modern high pressure boiler, softening treatment became essential.

A pulp or paper mill uses more water than any other one material; in other words, it is one of the raw materials of the industry, yet how seldom is it so considered. If the pulp or paper mill operator could fix this fact in his mind and realize the importance of giving it the same consideration that he gives to other raw materials, many troubles could be avoided or at least minimized.

Characteristics of Water

In any discussion of water, a fundamental knowledge of its composition is essential.

In its natural state, water is never pure. Rain water is perhaps the purest form, but even in falling through the atmosphere, water dissolves oxygen, carbon dioxide, sulphur oxides, and other gases. It also contains minute quantities of nitrogen compounds such as ammonium salts, and dissolved organic matter, plant spores, and bacteria. Water holding in solution the gases which it has taken up from the atmosphere becomes an active solvent for the various minerals that make up the earth's crust, such as compounds of calcium, magnesium, iron, manganese, aluminum, silicon, sodium, and potassium. All water, therefore, contains these elements, and to a less extent many others in amounts depending upon the character of the soil with which it has been in contact. Furthermore, as the descending rain, or snow, approaches the earth, it purifies the air and washes out of the atmosphere suspended particles of dust. These impurities, together with organic matter from vegetable organisms which develop and grow in the water, constitute what may be called "natural impurities" as distinguished from those derived from sewage and manufacturing wastes.

According to its source, water may be classified in general as rain water, surface water, and ground water. Rain water scarcely needs to be considered since it is never available in quantities sufficient for manufacturing purposes.

Surface water includes the water from brooks, rivers, ponds, and lakes, and it is these waters which are most commonly used for industrial purposes. They contain all the "natural" impurities, are usually softer, and contain less mineral matter and more organic matter than ground waters. Suspended matter is often present, and in the case of swampy or peaty surroundings, the water may be more or less discolored. Surface waters will vary greatly at different times; this is particularly true of river waters which

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

[1] Member TAPPI, President, Skinner and Sherman, Inc., Boston, Mass.

are influenced by rainfall, drought, and contamination from surface drainage, or from mill pollution.

Ground waters are those that come from deep wells and deep springs and on account of their long period of contact with the soil generally contain a larger amount of dissolved mineral matter. As a rule they are clear and free from suspended matter, partly on account of the lower content of organic and vegetable matter, and partly because of the filtering action of the soil.

Waters may also be classified as hard waters or soft waters. The constituents which make water hard are the salts of calcium and magnesium and to a less extent other dissolved mineral matter. Soft waters are those which are low in these constituents.

Some attempts have been made to prepare a specification for water suitable for pulp and paper manufacturing. According to the dictionary and also by common usage, a specification for a raw material is a definite and complete statement of its composition or properties. It would be very difficult to prepare such a statement for water.

The location of a paper mill is chosen by reason of a number of factors such as proximity to railroad facilities, cheap power, labor conditions, etc. While water is also an essential requirement most mills have to use the water that is available at the site where these other conditions are met and make the best of it.

Qualities Affecting Pulp and Paper Manufacture

There are, however, certain qualities which have an important bearing on pulp and paper manufacturing. These qualities are: (a) color, (b) suspended matter, (c) presence of iron, (d) presence of manganese and (e) hardness.

Water of uniform composition and temperature is desirable but these are conditions over which there is little control. Surface waters for example are influenced by rainfall, drought, and trade wastes. The variation in temperature from around freezing in winter to between 70 and 80 deg. F. in summer may cause variable manufacturing conditions. Plant and bacterial growth during the summer months is often the cause of annoyance.

I had occasion some time ago to do some work for a mill making a special fiber product. This mill always had trouble with spots on the product for about two months during the early part of the summer. About the first of August the trouble usually cleared up. Upon investigation it was found that these spots were due to bacterial growths which developed in the water at the summer temperatures. The mill was located in a hilly country and the river was fed by streams from the hills. Beginning about the first of August the nights became cooler in the hills, with the result that the temperature of the water dropped below the point at which these organisms would develop.

In another case difficulty was experienced in washing a product free from acid during the spring months. The difficulty was traced to the fact that the water at that season of the year was mainly melted snow and ice and approached the composition of distilled water.

Color

Water having little or no color is essential for the manufacture of any paper, except papers of inferior quality in which color and appearance are of no account.

Pure water is colorless; but almost all natural waters, except sometimes those from deep wells and springs, have some color. In surface waters, all variations in color are found, ranging from almost colorless to a deep brown or red. The color of water is generally due to dissolved organic matter derived from decaying vegetation, or to iron salts. In the case of some waters the color of the water may be improved by simple filtration, but its complete removal requires chemical treatment. The amount of color permissible depends entirely on the product to be manufactured. For high grade white paper it is desirable to have a water with a color of not over 5 as compared with the Platinum Cobalt Standards recommended by the American Public Health Association. This should be easily obtainable with proper chemical treatment.

Suspended Matter

Suspended matter is troublesome in the manufacture of paper or pulp because it becomes entangled in the fibers, which act as a very efficient filter, thus causing spots and other imperfections in the finished product. Suspended matter nearly always is colored, so that its effect is closely connected with that of dissolved coloring matter.

The amount of suspended matter varies over wide limits, particularly in river waters, where it is influenced by the rains, which wash finely divided soil, leaves, and other foreign matter into the streams. Sewage and mill effluents, both of which are commonly discharged into rivers, also contribute to the suspended matter of surface waters.

Iron

The presence of iron in water is most objectionable, since cellulose has the property of adsorbing iron and other metals, from dilute solutions. In the pulp and paper making processes, the cellulose is constantly in contact with the water, which is a dilute solution, and iron, if present, will therefore be adsorbed. This adsorption of iron results in a yellowing in the case of white papers, and in a dulling of all shades with colored papers, particularly the more delicate ones.

Iron is especially troublesome in the manufacture of photographic papers; and it is also claimed that the deterioration of sizing in papers that have been exposed to light is directly related to the iron content of the paper.

Iron may be present in water in both the ferrous and ferric condition. In the case of ground waters, iron is usually in solution as ferrous carbonate, $FecO_3$. The iron present in the soil is generally combined as ferric oxide, Fe_2O_3, and in this form is insoluble in water. If the water contains dissolved organic matter in appreciable amounts, the iron is reduced from ferric oxide to ferrous oxide, FeO; this combines with carbonic acid to form ferrous carbonate, which is soluble and goes into solution. When such waters come to the surface and are exposed to the air, oxidation takes place; the ferrous carbonate is decomposed, and is converted to ferric hydrate, $Fe(OH)_3$, which is insoluble.

In surface waters, the iron is nearly always present as hydrated ferric oxide, colloidally dispersed, although cases are known where trade wastes, such as pickling liquors from steel mills, are discharged into streams, and are responsible for the presence of ferrous iron.

Some years ago I had occasion to visit a mill making high grade writing paper. The superintendent was an excellent paper maker. He had made paper in other locations but was unable to duplicate his results in this particular mill. He suspected the water and had samples analyzed in his own laboratory and also sent some to independent laboratories, with the result that both pronounced it excellent for paper making purposes, provided that it was treated and filtered. On closer investigation, it was found that some miles above the mill there was located a steel plant which dumped large quantities of waste pickling liquor containing ferrous sulphate, a compound of iron in the reduced state. Ordinarily, "ferrous" iron is not present in water as it is oxidized by the dissolved oxygen in the water, or by contact with the air, to form "ferric"

iron, which precipitates as a red sediment and is easily filtered out. No test was made for ferrous iron; in fact by the time the sample was analyzed it would all have been converted to the ferric condition. The distance, however, between the steel mill and the paper mill was not great enough for all the iron to become completely oxidized, with the result that the ferrous iron passed through the filters and later became oxidized and the paper discolored. When tests were made at the plant for ferrous iron, its presence was found and several vexing conditions explained.

Manganese

The presence of manganese in the water supply of a paper mill may be exceedingly troublesome and its importance has been quite generally overlooked. It is not a common constituent of water, but is found in some localities at certain times of the year. The Connecticut River at Holyoke is a notable example.

Manganese behaves somewhat like iron but it oxidizes more slowly and with the formation of the black hydrated oxide instead of the familiar red oxide of iron. It causes effects similar to iron as to staining and discoloration. It is also objectionable in bleaching operations and if manganese bearing water comes in contact with stock containing bleach, the chlorine will oxidize the manganese to permanganates which impart a reddish color to the fibers.

Manganese is more troublesome than iron because of the black oxide deposits which may cause clogging of pipe lines. An authentic case is on record of a public water supplying containing 1.2 parts per million of iron and 0.8 part per million of manganese which caused clogging of meters and service pipes in less than two years after they were installed. The material causing the stoppage analyzed 30 to 33 per cent manganese and 12 to 15 per cent metallic iron.

Another instance is on record of a bleachery using water containing 0.3 part per million of manganese which was sufficient to stain the walls of the filtered water basin and to collect on the squeeze rolls of the washing machines.

Amount of Iron and Manganese Permissible

The amount of iron permissible in water used for paper making depends on the product to be manufactured. For high grade papers where color is a primary consideration, water that contains less than 0.1 part of iron per million is desirable although some high grade writing paper mills are operating satisfactorily with water whose iron content ranges from 0.1 to 0.2 part per million. In a properly designed plant for coagulation and filtration it should be possible to reduce the iron content to not over 0.05 part per million.

In the case of manganese, no figures are available as to a permissible amount. It may be safely stated, however, that it is desirable to effect as complete removal as possible. If the hydrogen-ion concentration of the water is low, the manganese oxidizes very slowly, but in contact with alkaline surfaces such as concrete, the precipitation of the black hydrated oxide is more rapid and may give rise to "black water" complaints.

Hardness

It is a distinct disadvantage to use hard water in washing pulp, particularly sulphite pulp, since insoluble calcium and magnesium resinates are formed; these deposit on the fiber, making subsequent bleaching difficult. In the soda pulp process, hard waters are also objectionable, since calcium and magnesium salts are precipitated by the caustic soda and carry down coloring matters that are also difficult to bleach. For these reasons, the use of soft water is much to be preferred. In the coloring of paper, soft water is also desirable, since the carbonates cause precipitation of the salts that are ordinarily used as mordants.

Hard waters are troublesome when sizing with rosin; the mineral salts react with the size, forming insoluble calcium and magnesium resinates, which have no sizing action. Furthermore, according to some investigators the salts present in the water affect the colloidal condition of the size, tending to make the rosin gather into large particles, thereby reducing their covering power.

The difficulty of sizing with hard waters can be overcome to some extent by increasing the amount of alum, and also by adding it to the furnish before the size is added. It is claimed that rosin size has a selective action and precipitates with alum, rather than with calcium and magnesium salts; it is for this reason that alum is sometimes added to the furnish before the rosin size. The use of protective colloids, such as glue or casein, has been suggested as a remedy for the difficulties of sizing with hard waters.

Hard waters are also objectionable because of the tendency to form scale wherever they are constantly in contact with metal parts, such as pumps and the wet end of the paper machine. This scale has a tendency to break away, and cause endless trouble. When machine wires become coated with the scale, frequent souring with sulphuric acid is necessary, which greatly shortens the life of the wires.

While soft waters are more desirable, they are not absolutely essential; excellent papers are made with hard water that meets the other requirements of freedom from iron, manganese, color, and suspended matter. The Berkshire Hills district of Western Massachusetts furnishes a fine example of the manufacture of high grade paper of the finest quality with relatively hard water. In another instance, in a different locality, a mill is actually producing book paper of high quality with a very hard water, one containing as high as 700 parts per million of solid matter.

Purification of Water

The methods of purification will depend to a large extent on the particular water to be used. Waters which are low in the objectionable properties mentioned above can sometimes be sufficiently improved for the purposes of many mills by simple filtration through sand filters. Filtration will remove suspended matter, unless it is colloidal in character. It will in many cases improve the color and sometimes lower the content of iron.

Mechanical Filtration

If the water contains appreciable amounts of impurities or if the requirements of the mill are such that high quality of product is essential, mechanical filtration must be employed. The essential features of mechanical filtration are the addition of a coagulant, a period of settling for the elimination of most of the "floc" formed by the coagulation and filtration through sand filters at a rate considerably in excess of that obtained in an ordinary sand filter where coagulation is not employed. Color, suspended matter and iron may be effectively removed by mechanical filtration. Manganese removal is more difficult and requires special treatment such as forcing the water through a bed of pyrolusite which acts as a catalyzer and converts the manganese in solution to manganous hyroxide. This is oxidized to manganic hydroxide and manganese dioxide and may be filtered out.

Coagulants

While there are a number of chemicals used for coagulation purposes, alum is the one most commonly used. It

has the advantage of being cheap, easily available and with most waters satisfactory coagulation can be obtained under easily controlled conditions.

The aluminum sulphate reacts with the metallic carbonates in the water and forms aluminum hydrate which is gelatinous in character. The positive aluminum ions also combine with the negatively charged ions of the colloidal color particles and of the silt in suspension. This hydrous aluminum oxide "floc" traps other silt particles mechanically and under properly controlled conditions collects in relatively large "flocs" which settle readily.

The alum is usually added in solution and the proper dosage is controlled by the hydrogen-ion concentration. The optimum hydrogen-ion concentration or the point at which the best "floc" formation occurs varies with different waters and oftentimes with the same water at different times. It must therefore be determined in each individual case. Brom thymol blue is the indicator most generally used, since most waters fall within the range of 6.0 to 7.6. Cresol red is used on more alkaline waters and cresol green on acid water.

If the water does not possess sufficient alkalinity to react with the aluminum sulphate, soda ash may be added to effect the desired coagulation. In the case of very alkaline water, the amount of alum necessary to neutralize the alkalinity of the water may be excessive, in which case sulphuric acid is added to neutralize a portion of the alkalinity before the alum is added, thus effecting a saving in the cost of treatment.

Ferric chloride and ferric sulphate are becoming popular coagulants and have the advantage of forming a compact and easy setting "floc" at any pH above 3.5 making them practical over a wide range of hydrogen-ion concentrations.

Sodium aluminate is another coagulant which has come into use during recent years and is most effective with waters of low pH and which require the use of an alkali like soda ash in order to produce a satisfactory "floc". The choice of coagulants is governed by the characteristics of water to be treated and by economic conditions.

After the coagulating chemicals are added to the water, agitation is necessary to cause the proper formation of floc. The design of the mixing chamber is very important since the best floc formation is governed by the time and velocity of mixing.

Sedimentation

From the mixing chamber the water passes to the sedimentation basin which should be of such a size as to permit the "floc" to settle in the time that it takes for the water to travel through the basin. The time of settling varies from 30 minutes to 3 or 4 hours, according to the character of the water. Usually a detention period of from 2 to 3 hours is required. From the sedimentation basin the water passes to the filters.

Filtration

There are two types of sand filters, namely gravity and pressure. The filtering medium of sand is the same in both types and the principal difference is that the gravity filter is an open concrete tank whereas the pressure type is a closed steel tank. The advantage of the pressure type of filter is that it occupies less space and the water is pumped from the source of supply direct to the distributing points without double pumping equipment, which is usually necessary with gravity filters.

The systematic washing of the filters by reversing the flow is important and these should be opened up periodically and if necessary given a caustic soda wash. We recently had occasion to make a survey of a paper mill and found that the filters had not been opened up in ten years.

Porous Tube Filters

Mention should be made of a new type of filter which has recently come on the market. Porous tubes of various ceramic materials have been used more or less extensively for filtration purposes, but have never been practical for water filtration on a large scale, because of the number of units required and the necessity of frequent back-washing. Recently, however, there has been developed a new type of filter known as the *automatic tube filter* designed to overcome these objections.

These filters consist of a series of tubes made from fused aluminum oxide encased in a steel shell. The water passes into the tubes and filters through the tube wall, leaving any suspended matter on the interior wall of the tube. The tubes are provided on both ends with rubber lined sleeve valves operated by a piston. At timed intervals, air or water pressure is admitted to the underside of the piston in the control chamber. This causes the piston to move upward carrying the sleeve valves with it, closing the inlet port at the top and opening the outlet port at the bottom of the tube. This action releases the raw water pressure within the tube, and the filtered water pressure on the outside of the tube causes a reversal of the flow which cleans off the material which has been filtered out of the water and allows it to go to waste through the bottom valve of the tube.

At the end of the back-wash period, the automatic control mechanism releases the pressure from the lower side of the piston, causing the sleeve valves to return to their original position. The frequency and time of the backwashing cycle will depend on the character of water being filtered. The control mechanism is so arranged that only a part of the tubes are backwashed at one time, the others continuing filtering, thus maintaining a continuous supply of filtered water.

Several installations of this type of filter have been made in pulp or paper mills with apparent success. In the case of waters where color is not objectionable and chemical treatment with coagulation unnecessary, this type of filter has certain advantages. If a colorless water, free from iron or other objectionable impurities, is required, chemical treatment with coagulation and sedimentation would be necessary as in the case of any other type of filter. In such cases, if the floc is heavy, it may build a high resistance in the tubes and cause reduced capacity.

The chief advantages are the saving of space and the low cost of installation. It is claimed that a filter consisting of a shell 36 inches in diameter and 6 feet high, containing 30 tubes, will filter approximately 1,000,000 gallons per day of 24 hours. In one installation, consisting of five units with a capacity of 6,000,000 gallons per day, the floor space required is 180 square feet.

The cost of installation of this type of filter is in the neighborhood of $2,000 per million gallons capacity and is about one-fourth of the cost of ordinary sand filters.

Chlorination

All surface waters and occasionally some ground waters contain bacteria in varying numbers. These bacteria develop and accumulate in stock systems of pulp and paper mills and cause what is commonly known as paper slime.

The universal use of chlorine for the sterilization of public water supplies suggested the use of chlorine to reduce the number of bacteria in the water supply of pulp and paper mills and its use has become quite general, either as liquid chlorine or as chloramine. The latter is better adapted for use in pulp and paper mills because of its longer sterilizing action.

CORROSION

Water is corrosive and it is sometimes necessary to apply a corrective treatment. Most water contains dissolved oxygen and free carbon dioxide which are factors in causing corrosion. In the mechanical treatment of water, especially when alum is used as the coagulant, the amount of carbon dioxide is increased in proportion to the alum used.

Carbon dioxide also is a factor in accelerating the corrosion of metals. It dissolves in water, forming a weak acid which increases the hydrogen-ion concentration of the water. If the water contains bicarbonates of calcium and magnesium, a portion of the carbon dioxide is required to hold these in solution. Any excess is free and known as "aggressive" carbon dioxide. Hard waters, for example, may contain appreciable amounts of carbon dioxide without becoming aggressive, whereas soft waters may be aggressive with relatively small amounts of carbon dioxide.

Under ordinary conditions, increased acidity or hydrogen-ion concentration stimulates corrosion by preventing the formation of protecting films or by removing them. Free acids are seldom found in water unless contaminated by trade wastes, but if present, they increase corrosion by evolution of hydrogen and depolarizing the metal surfaces. Alkalies which are more likely to be present in water reduce the hydrogen-ion concentration and make the water less corrosive. The effect of hydrogen-ion concentration is more marked at high temperatures and the velocity of the water through pipes also increases corrosion due to the removal of protection films which may form.

Water Softening

The chemical treatment of a water supply for a pulp and paper mill is not as a rule economically feasible. It is, however, desirable in some mills to soften by chemical methods that portion of the water used for sizing purposes and in most mills that portion used for steam boilers.

The lime-soda and the zeolite processes are the methods most commonly used where softening is necessary. With the zeolite process it is possible to reduce the hardness to practically zero whereas with lime-soda the practical limit is about 5 grains per gallon.

The choice between these two methods or possibly a combination of the two depends on the character of the water and the amount to be softened. In general the lime-soda process requires more attention as the additions of chemicals have to be varied according to the hardness of the water. The size of a lime-soda softener is determined by the amount of water regardless of its hardness, whereas the capacity of a zeolite softener to deliver water at a specified rate depends directly on the hardness. In the case of turbid waters or waters containing free acid or iron, the lime-soda process woud be preferable unless the zeolite softener is used in conjunction with a purification plant.

Zeolite softeners have the disadvantage of increasing the concentration of sodium salts which may cause priming if the water is to be used in steam boilers. Zeolite softened water may also cause corrosion and pitting in steam boilers unless the alkalinity is regulated.

Importance of Water Control

The author's contact with industrial plants emphasizes the fact that those responsible for their management do not sufficiently appreciate the importance of the quality of the water used in their processes. In the early days of the paper and textile industries, the requirements as to quality in the product were not particularly rigid, and it was easily possible to get along, as the water from the streams was soft and reasonably clear. With increasing competition, specifications became more severe and a mill having a water which, for example, contained more iron or was more highly colored than its neighbor's had difficulty in producing a product of the required degree of whiteness. Recently the writer had occasion to examine the water from two plants, both making the same kind of material. The water in one plant had a low color, whereas the water in the other plant had a relatively high color. The latter plant was operating on untreated water, but the more rigid requirements brought about by competition forced them to install a complete plant for purifying their water supply.

This emphasizes the importance of having a full knowledge of all the conditions before reporting on the suitability of a water for a given purpose. It is more or less common practice to submit a sample of water to a chemical laboratory for analysis and an opinion as to its suitability. The interpretation of the analysis should be made by a chemical engineer who has specialized on water problems, and who has investigated the supply from which the water was taken. In addition he should be familiar with the conditions under which the water is to be used in order to advise proper purification.

The importance of chemical engineering assistance in the design and operation of water-treating plants cannot be emphasized too strongly. The author knows of an instance where the water from the sedimentation basin was pumped a distance of several hundred feet to the filters and on the way was passed through the condenser of a turbine engine for cooling purposes. The process of coagulation and sedimentation is based on keeping the water moving at a low velocity in order that the precipitated floc may be as large as possible. Pumping the water through a condenser resulted in efficient mixing, thus undoing much of the work of the settling basin.

There are, as you all well know, many manufacturers of water equipment who render complete engineering service, but it should be recognized that they all have something to sell. It should be borne in mind, however, that they do not have facilities for testing out new ideas, in fact it would not be practical for them to do so on account of the variety of conditions which they are required to meet. The result is that new ideas are tried out at the expense of the purchaser of equipment and if they are not successful a controversy results. The writer has seen instances where this very thing has happened and in at least one instance a lawsuit was instituted by the purchaser on the ground that the conditions guaranteed by the manufacturer were not fulfilled. This situation emphasizes the importance of having an experienced water engineer pass on the design of equipment before a purchase agreement is signed. It is also important that the treatment of water should be considered as a chemical engineering operation and should be under the control of the chemical staff of a mill.

Not long ago the writer heard of a case where a coagulation and sedimentation treatment was put into operation by the engineer of the company installing the equipment. About a week or ten days later, he returned to find out how the plant was working, and found to his amazement that the foreman in charge had disconnected the chemical feeds, and was simply passing the water through the filters without any coagulating treatment. Upon inquiry it was learned that the man in charge thought that the filters were taking out too much dirt and that he had to wash them to often.

This incident illustrates a situation which is prevalent in too many mills. A friend of mine once said that tech-

nical control did not mean the employment of a chemist just out of college who reported results which were probably erroneous to an executive who didn't understand them.

Every plant operating any process of a chemical nature should have a chemical engineer on its staff or as a consultant. It is well known that there are many manufacturers who have made money in the past but who are unable to do so under present competitive conditions. In a number of instances this is due to the fact that fine points of operation have been neglected, among which may be mentioned the proper treatment and utilization of their water supply. The successful manufacturer of today insures the continuation of profitable operation by instituting technical control under the supervision of a competent chemical engineer.

Abstracts and Bibliography Committee Report 1936-37*

The work of the Committee of the Technical Association of the Pulp and Paper Association on Abstracts and Bibliography for 1936 has been confined largely to a continuation of projects which are more or less routine, and yet demand constant attention in order that the literature and the patents of interest to the industry may be made available as promply as possible.

Abstracts

During the calendar year 1936 there appeared 136 pages of abstracts. Comparative statistics for the last ten years are as follows:

1927	65	1932	140
1928	66	1933	80
1929	71	1934	151
1930	153	1935	97
1931	171	1936	136

Every Paper Making Magazine Covered

At the present time it is believed that every paper making magazine is being covered. The chairman is fortunate in having access to the very excellent library of The Institute of Paper Chemistry and also makes use of the very complete coverage of scientific and technical periodicals by Chemical Abstracts.

Bibliography

Through the financial support of TAPPI and the cooperation of the National Research Council and of H. J. Berger, Editor of the PAPER TRADE JOURNAL, the second collective volume of the "Bibliography of Paper Making," covering the period 1928 to 1935, appeared in the spring of 1936. This is a volume of 803 pages. It contains an author index, a feature which, unfortunately, was missing in the first volume.

It is regretted that it was found necessary to omit the publication of the annual volume for 1935, but financial considerations made it impossible to print the material for the year 1935 in more than one place.

The 1936 Bibliography

The annual bibliography for 1936 is completed and in the hands of the printer. In addition to the periodical literature for 1936, this will contain a classified list of United States patents for the two years, 1935 and 1936. At present, the patents for 1935 are available only as the quarterly lists in the Paper Trade Journal. Because of the value of the patents to the industry, it was felt that they should be made available in permanent form.

Patents

Quarterly lists of United States patents for 1936 have appeared in the Paper Trade Journal as follows:

1st Quarter	102, no. 16:33-35
2nd Quarter	103, no. 2:26-28
3rd Quarter	103, no. 16:35-37
4th Quarter	104, no. 3:35-37

As mentioned above, the complete list of patents for 1935 and 1936, arranged according to the Patent Office Classification, will appear in the Annual Bibliography.

In the preparation of the quarterly lists, patents are selected from the Official Gazette. However, in the preparation of the annual list, advantage is taken of the patent list, compiled monthly by Miss Elizabeth Hunter, of the Mead Corporation Library, and of the abstracts which appear in the Paper Industry, the Paper Mill, the Technical Section, and Chemical Abstracts. Therefore, the annual list is more than a mere cumulation of the quarterly lists.

Indexes

Indexes for the two volumes of the PAPER TRADE JOURNAL, 102 and 103, appearing in 1936, have been prepared and published.

Current Research

Through the cooperation of the research workers in university and government laboratories, a revision of the original survey of "current research" in the field of pulp and paper (*see* Paper Trade Journal 100, no. 20:41-52; 101, no. 7:36-42 (1935)) has been prepared and submitted for publication. Such revisions will be made every two years. It is hoped that it may serve a useful purpose.

In concluding this report, the chairman would be very ungrateful if he did not express his appreciation to the Executive Committee of TAPPI for its wonderful recognition of the work of the Committee over a period of the last fifteen years. While the award of the TAPPI Medal is a very high honor, it is felt that the most important aspect of the award is the recognition, by a Technical Association, of a bibliographic service to an industry. It is a very broad-minded viewpoint and is one which should encourage other Associations to undertake such a service to their members. In this connection, it is interesting to note that such has been started for the rubber industry through the labors of Donald E. Cable of the United States Rubber Products, Inc., Passaic, N. J., who is a member of TAPPI.

In accepting the medal, the chairman wishes to express his appreciation of the assistance of the members of the committee on Abstracts and Bibliography, especially A. Papineau-Couture, who has rendered very valuable service for more than fifteen years, and to Miss Callie Hull, of the National Research Council, who cooperated in the preparation of the two collective bibliographies.

CLARENCE J. WEST, *Chairman*,

TAPPI Abstracts and Bibliography Committee.

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., Feb. 22-25, 1937.

Pulp and Paper Industry Literature Review

Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Raw Materials

Cotton and its Chemical Reactions. James F. Holmes. Textile Colorist 58:83-85 (1936).—The constitution of cellulose, and the effects of alkalies, acids, salts and oxidizing agents on cotton are briefly discussed.—A.P.-C.

A New Source of Rayon Pulp: Bamboo. Joseph Sala. Rusta 11:517-523 (Sept., 1936).—A description of Sala's Fr. pat. 763,906 for the production of rayon grade pulp from bamboo. Cut bamboo is dried in the open air, treated with running water, ground into a kind of tow, and the latter is boiled in an autoclave with a solution formed of an alkali and a reducing agent such as a sulphite under a pressure of 0.5 to 1.0 atmosphere. The material is washed in the autoclave, with hot water and then with cold water, and the pulp is subjected in the same autoclave to the action of a second liquor which may contain caustic soda together with sodium sulphide, sodium sulphide and guaiacol for 1 hr. at 156° C. and under 4.8 atmospheres pressure and then for a few hrs. at 143° C. under 3 atmospheres pressure. The pulp is washed in the autoclave, first with water emulsified with benzene and then several times with cold water agitated and diluted with water, treated with a thickener and then in a disintegrator defibrator, oxidized with sodium hypochlorite solution, washed, treated with hydrofluoric acid solution, washed, thickened, and treated in an autoclave with sodium sulphite at 60° C. and 2 atmospheres pressure, washed, bleached with sodium peroxide or hydrogen peroxide, again washed, and dried.—A.P.-C.

Fibrous Raw Materials Developments. John Traquair. Tech. Assoc. Papers 19:331-333 (June, 1936); Paper Trade J. 103, No. 9:33-35 (Aug. 27, 1936).—A brief review of the literature published in 1935, with bibliography of 35 references.—A.P.-C.

Technical Control of Deinking Operations. P. R. Hines and J. J. Bean. Paper Trade J. 103, No. 10:37-41 (Sept. 3, 1936).—A method of controlling deinking operations, applicable only to the deinking of papers containing fillers and based on the "two product" formula extensively used for controlling metallurgical concentration processes, is described, explained and illustrated by means of an example. The merits of the method are discussed.—A.P.-C.

Freeing Flax Chaff from Bast Tissue. M. Ya. Robinov. Bumazhnaya Prom. 15, No. 3:59-60 (1936); C. A. 30:7336.—Flax chaff is freed from bast fiber, sand and dust preliminary to sulphate pulping in an improved apparatus, which is illustrated and described.—C.J.W.

Use of Licorice Root in the Manufacture of Cellulose. Stefano Di Palma. Chim. ind. agr. biol. 12:178 (1936); C. A. 30:7329.—The chemical and physical characters of the root fibers of *Glycirrhyza glabra* (after the extraction of licorice) are given. The cellulose content is about 50 per cent. It is suggested that these residues may be used for the manufacture of cellulose (pulp).—C.J.W.

Chemical Composition of Rye Straw. L. P. Zherebov and A. M. Paleev. Bumazhnaya Prom. 15, No. 3:16-24 (1936); C. A. 30:7328.—The method of Runkel and Lange, applied to the preparation of fibrous substance from rye straw, shows similarly to red beechwood, a definite ratio between difficulty soluble xylan and cellulose. The methoxy groups in the original straw and the fibrous substance are substantially combined with lignin (19-20 per cent MeO). The cellulose content, determined by the Schmidt method, does not exceed 41 per cent. This confirms the view of Hägglund and Klingstadt that the usual determinations of cellulose give high values. Rye-straw holocellulose, obtained by the method of Ritter and Kurth, hydrolyzed with one per cent sulphuric acid, leaves a complex identical with that of the Cross and Bevan cellulose. On further hydrolysis with sodium hydroxide a more stable complex is formed, containing cellulose and pentosans in the ratio of 3:1.—C.J.W.

Cellulose and Lignin

The Molecular Structure of Cellulose, Hydrocellulose and Oxycellulose. G. F. Davidson. Silk J. 13, No. 145: 2125 (1936).—The chemical modifications of cellulose in the light of the molecular chain theory is presented. The examination of many hydrocelluloses shows a definite relation existing between the copper number, tensile strength and fluidity, irrespective of the conditions of acid treatment. The fluidity of 0.5 per cent solution of modified cellulose is related to tensile strength in roughly linear manner over a wide range of strength changes and is the chief reason why the term fluidity is now preferred to its reciprocal, namely, viscosity. In respect to oxycellulose, while the development of reducing power by acid attack must correspond to rupture of chains, its development by oxidizing attack theoretically need not. With modified cellulose, the assumption that the attack on the chains from the reducing end is progressive, removes the main difficulty in the chain-shortening hypothesis. In the behavior of oxycellulose with boiling alkalies, the rupture of the chain molecules is the true explanation of the anomalous behavior of the dichromated oxycellulose and is confirmed by experiments which are described.—A.P.-C.

Absorption Edges in the X-Ray Patterns of Native and Mercerized Cellulose. Wayne A. Sisson, George L. Clark and Edward A. Parker. J. Am. Chem. Soc. 58:1635-1639 (Sept., 1936).—Diffracted general radiation from the 002 and 101 planes in native and the 101 plane in mercerized cellulose produces, on the X-ray negative, well-defined bromine and silver absorption edges which are similar in appearance to diffraction lines. Criteria for distinguishing absorption edges from diffraction lines are discussed. Absorption edges correspond to some, but not all, of the large interferences or micellar dimensions for cellulose reported in the literature. No spacings larger than the cellulose unit cell were found.—A.P.-C.

Photochemical Reactions of Cellulose. V. Radiation from the Vitalight Lamp, the Incandescent Electric Lamp, and the Quartz Mercury-Vapor Lamp. S. Oguri. J. Soc. Chem. Ind. Japan 39:143-145B (1936).—Measurements of radiation in the ultra-violet, visible, and infra-

red regions are recorded for a Vitalight lamp (an ultra-violet lamp for sun-bathing), a 100-watt Tô lamp (used for ordinary illumination), and a quartz mercury-vapor lamp; the last is much the richest in ultra-violet rays.—A.P.-C.

The Retentivity of Water by Purified Cotton Cellulose. Homer A. Hamm and W. A. Patrick. Textile Research 6:401-409 (1936).—The adsorption of water vapor by cellulose was studied under conditions to ensure equilibrium. Under these conditions it was found that cellulose exhibited no hysteresis.—A.P.-C.

The Reversibility of Alkali Cellulose and Native Cellulose. N. Matsumoto. J. Soc. Chem. Ind. Japan 39:228B (1936).—The changes of alkali celluloses in washing with distilled water were studied. Alkali cellulose could be transformed into hydrated cellulose or native cellulose, according to the method of washing. The changes between native cellulose and alkali celluloses A and B are reversible.—A.P.-C.

Molecular Structure of Cellulose and Starch. G. F. Davidson and W. A. Richardson. Science Progress 31:68-77 (1936).—A review of recent work with bibliography.—A.P.-C.

The Molecular Weights of Cellulose. S. M. Neale. Chemistry & Industry 55:602-605 (July 31, 1936).—A survey of recent work.—A.P.-C.

Contribution to the Knowledge of the Nature of Lignin Derivatives. Fritz E. Brauns. Pulp Paper Mag. Can. 37:569-571 (Sept., 1936); Paper Trade J. 103, No. 11:41-42 (Sept. 10, 1936).—The results obtained by Brauns and Hibbert and co-workers are compared with those recently published by W. Fuchs and by Freudenberg. The agreement noted in the results of these several investigators shows that it is possible, using always the same conditions, to obtain similar results in lignin investigations, and that discrepancies are due to the application of different experimental conditions.—A.P.-C.

Lignin in Douglas Fir. Composition of the Middle Lamella. A. J. Bailey. Ind. Eng. Chem., Anal. Ed. 8:52-54 (Jan. 15, 1936).—A single sample of middle lamella weighing 0.521 mg. was analyzed and the lignin content found to be 71.38 per cent. Samples of wood rays, springwood, and summerwood, weighing approximately 3 mg., gave values of 41.09, 35.24, and 31.56 per cent, respectively, all values being based on the original oven-dry weight of the isolated material.—A.P.-C.

Lignin in Douglas Fir. The Pentosan Content of the Middle Lamella. A. J. Bailey. Ind. Eng. Chem., Anal. Ed. 8:389-391 (Sept. 15, 1936).—A description of the continuation of the analysis of the middle lamella which was isolated mechanically by a micro-manipulator in order to determine the pentosan content of the middle lamella. Methods of hemicellulose analysis are discussed and data on hemicellulose in Douglas fir reported. An accurate gravimetric method of determining pentosans by steam distillation and precipitation of the furfural by thiobarbituric acid is suggested. The procedure for the determination of pentosans on both macro- and micro-samples are outlined and the precision of each is indicated. An isolated sample of middle lamella of Douglas fir showed a pentosan content of 14.21 per cent. A direct and nearly constant relation between lignin and pentosan contents was found in different wood elements. This suggests that pentoses take part in the formation of lignin, although the indicia are circumstantial. The importance of the findings is discussed.—A.P.C.

Sulphate Process

Studies in the System Calcium Oxide-Sulphur Dioxide-Water. IV. Vapor-Pressure Studies in the Presence of Cellulose and Wood. P. E. Gishler and O. Maass. Can. J. Research 14B:301-309 (1936).—A new technic has been developed for the purpose of studying, by means of vapor-pressure changes, the effect of wood and cellulose on the system CaO-SO_2-H_2O. Preliminary experiments are described. A sample calculation is given to indicate that vapor-pressure changes may be used to determine the relative rates of consumption of sulphur dioxide and lime during the cooking of wood. Cellulose does not yield carbon dioxide in appreciable quantities during cooking.—A.P.-C.

Forced Circulation in the Cooking of Sulphite Pulp. Wurz. Jahresber. 1934, Ver. Zellstoff Papier Chem. Ing. 1935:57-63; Chemie et Industrie 36, 372 (Aug., 1936).—A critical discussion from which it is concluded that forced circulation is advisable only in exceptional circumstances. The principal advantage is that the time of filling, degassing and emptying the digester is decreased, so that the time of actual cooking can be increased.—A.P.-C.

Production of Sulphite Pulp from Spruce Damaged by Sap Rot and by Blue Stain. F. Komarov, I. Nagrodskii and I. Belyaev. Bumazhnaya Prom. 15, no. 5:33-38 (1936); C. A. 30:7334.—The results of comparative laboratory sulphite pulping of spruce, normal and damaged by blue stain and by destructive sap rot, are described. The blue-stained spruce gave a greater yield of pulp by weight and volume than the normal wood. The bluish pulp is completely decolorized in bleaching. The sap-rotted wood gave a greater pulp yield by weight; the product is somewhat inferior in mechanical properties.—C.J.W.

Sulphite Liquor. S. F. Mel'nikov and A. P. Biserov. Russian patent 41,330 (Jan. 31, 1935); C. A. 30:7346.—Furnace gas is passed through a tower charged with limestone and flushed with water, whereby sulphur dioxide is passed through a second tower for its absorption by the semi-finished acid flushed through the tower.—C.J.W.

Miscellaneous

New Developments in the Pulp Industry. George Jayme. Papier-Fabr. 34, no. 32:297-302; no. 33:305-308 (Aug. 9, 16, 1936); World's Paper Trade Rev. 106, no. 3:220, 222 (July 17, 1936); Angew. Chem. 49, no. 38:700 (Sept. 19, 1936); Wochbl. Papierfabr. 67, no. 27:504-505 (July 4, 1936).—A review is given of the different possibilities for further improvements in the pulp industry, with special reference to recent developments in the United States and Canada. The article discusses ways for creating new sources of wood, cooking procedures, fines or flour in pulp, the latest conceptions of fiber structure, bleaching and refining at elevated and low temperatures, bleaching of kraft pulp, testing methods and special applications.—C.J.W.

Technical Developments in the Paper Industry. Hellmuth Schwalbe. Papier-Fabr. 34, no. 31:294-295 (Aug. 2, 1936).—A brief review is given of recent important developments in the pulp and paper industry, all of which are based on scientific research, such as improved pulps, new fillers and sizes, improved printability and new testing methods for whiteness, color, transparency and printability.—C.J.W.

Hundred Years of the Institute of Technology at Darmstadt. 1836-1936. Hans Bömcke. Papier-Fabr. 34, no. 26:207-212 (June 28, 1936).—The gradual development of the different departments of the Institute is described. Special reference is made to the founding of a separate department of paper engineering in 1905 and the Institute for Cellulose Chemistry in 1908.—C.J.W.

The Name

COES

has been on

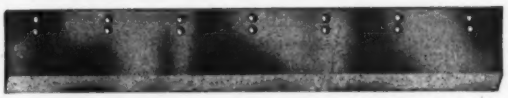
KNIVES

Since 1830

107 Years

Specializing on all types of

Paper Blades



MICRO GROUND

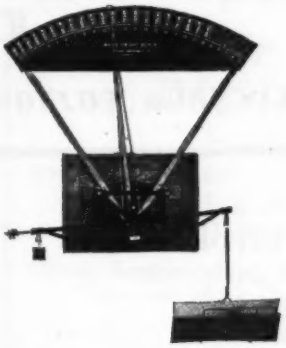
Loring Coes Company

Est. 1830

Worcester, Mass.

MICRO GROUND

THWING
BASIS WEIGHT SCALE



Indicates the weight of a ream of paper by weighing a single sheet.

The Thwing Basis Weight Scale has jeweled bearings just like a high grade accurate watch. This gives extreme sensitivity. Readings are accurate to 1/10 pound per ream.

The Thwing Basis Weight Scale detects the slightest differences in weight. It saves its cost quickly.

462

THWING-ALBERT
INSTRUMENT COMPANY
3341 Lancaster Ave., Philadelphia, U. S. A.
PAPER TESTING INSTRUMENTS

Sinclair
Single Pedestal
Stand

Sinclair
DOUBLE TRUSS
DANDY ROLLS
Mounted in the
Sinclair Single Pedestal Stand
is the last word in an Open End Dandy Roll Application

THE SINCLAIR COMPANY
HOLYOKE • MASSACHUSETTS
FOURDRINIER WIRES · CYLINDER WIRES · DANDY ROLLS · CYLINDER MOULDS

APPLETON
JORDANS

A SIZE FOR EVERY REFINING PROBLEM FOR ALL GRADES OF PAPER STOCK

THE APPLETON MACHINE COMPANY · Appleton, Wisconsin

IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING MARCH 20, 1937

CIGARETTE PAPER

Champagne Paper Corp., *Normandie,* Havre, 600 cs.; Champagne Paper Corp., *Alaunia,* London, 120 cs.; R. J. Reynolds Tobacco Co., *Manhattan,* Havre, 148 cs.

WALL PAPER

F. Blank, *Pr. Roosevelt,* Hamburg, 6 cs.; S. K. Lonegren, *Drottningholm,* Gothenburg, 6 bxs.; S. K. Lonegren, *Europa,* Bremen, 2 cs.; American Express Co., *Manhattan,* Havre, 7 bdls., 5 cs.; F. J. Emmerich, *Hamburg,* Hamburg, 3 bls.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Banker,* London, 2 bls., 1 cs.

NEWSPRINT

N. Y. Evening Journal, *Markland,* Liverpool, N. S., 714 rolls; N. Y. Tribune, *Markland,* Liverpool, N. S., 1670 rolls; World Telegram, *Markland,* Liverpool, N. S., 825 rolls; Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 752 rolls; Westchester Newspapers, *Markland,* Liverpool, N. S., 50 rolls; Parsons & Whittemore, Inc., *Markland,* Liverpool, N. S., 562 rolls; Jay Madden Corp., *City of Fairbury,* Hango, 598 rolls; Jay Madden Corp., *Hamburg,* Hamburg, 195 rolls.

PRINTING PAPER

Oxford University Press, *Andania,* Liverpool, 5 cs.; Japan Paper Co., *Hamburg,* Hamburg, 6 cs.; W. Bersch, *Hamburg,* Hamburg, 12 bls.

WRAPPING PAPER

Jay Madden Corp., *Pr. Roosevelt,* Hamburg, 1239 rolls; Jay Madden Corp., *Drottningholm,* Gothenburg, 3180 rolls; Guaranty Trust Co., *Drottningholm,* Gothenburg, 1513 rolls; Guaranty Trust Co., *Hamburg,* Hamburg, 7 cs.

KRAFT PAPER

Lunham & Reeve, Inc., *Drottningholm,* Gothenburg, 138 bls. 1047 rolls.

FILTER PAPER

E. H. Sargent Co., *Drottningholm,* Gothenburg, 12 cs.; E. H. Sargent Co., *American Banker,* London, 2 cs. H. Reeve Angel & Co., Inc., *Alaunia,* London, 15 cs.

FILTER MASSE

A. Giese & Son, *Hamburg,* Hamburg, 29 bls.

FILTER COMPOUND

P. H. Petry & Co., *Hamburg,* Hamburg, 80 bls.

DRAWING PAPER

Japan Paper Co., *American Banker,* London, 2 cs.; H. Reeve Angel & Co., Inc., *Alaunia,* London, 8 cs.

SURFACE COATED PAPER

Gevaert Co. of America, *Pennland,* Antwerp, 102 cs.; C. Happel, *Hamburg,* Hamburg, 2 cs.

METAL COATED PAPER

K. Pauli Co., *Hamburg,* Hamburg, 12 cs.

PHOTO PAPER

———, *Berengaria,* Southampton, 3 cs.; Heemsoth Kerner Corp., *Hamburg,* Hamburg, 3 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Andania,* Liverpool, 12 cs. (duplex).

DECALCOMANIAS

Sellers Transportation Co., *Europa,* Bremen, 56 cs.

WRITING PAPER

Globe Shipping Co., *Manhattan,* Hamburg, 1 cs.

TRANSFER PICTURES

Rohner Gehrig & Co., *Europa,* Bremen, 26 cs.

TRANSPARENT PAPER

Gallagher & Ascher, Drottingholm, Gothenburg, 16 cs.

TISSUE PAPER

Irving Trust Co., *Sanyo Maru,* Kobe, 20 cs.; Japan Paper Co., *Sanyo Maru,* Kobe, 23 cs.; Atlantic F'd'g. Co., *Hamburg,* Hamburg, 8 cs.

STRAWBOARD

Arrow Paper Products Co., *Beemsterdyk,* Rotterdam, 12 rolls; J. P. Heffernan Paper Co., *Beemsterdyk,* Rotterdam, 100 pkgs.

BOARD

Miller Paper Co., *Drottningholm,* Gothenburg, 49 bls.

PAPER SPOOLS

J. I. Bernitz Co., *Pr. Roosevelt,* Hamburg, 5 cs.

PAPER BOARDS

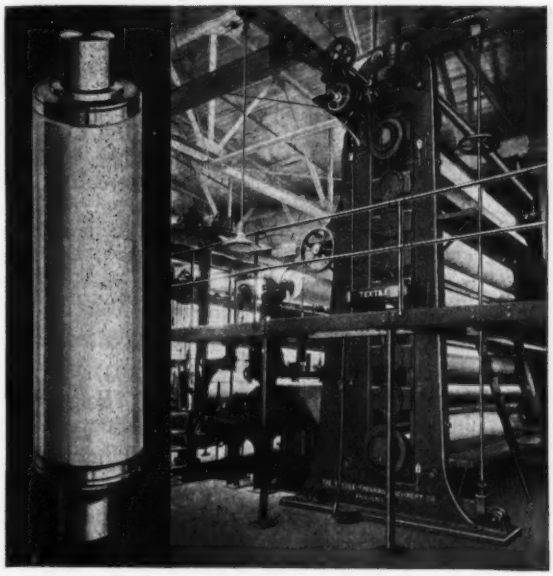
J. P. Heffernan Paper Co., *Pennland,* Antwerp, 15 cs.

MISCELLANEOUS PAPER

Almo Trading Importing Co., *Normandie,* Havre, 15 cs.; A. Johnson & Co., *Drottningholm,* Gothenburg, 15 bls., 129 rolls; F. L. Kramer & Co., *Drottningholm,* Gothenburg, 155 bls. 22 rolls; The Borregaard Co., Inc., *Drottningholm,* Gothenburg, 125 bls., 1047 rolls; ———, *Hamburg,* Hamburg, 7 cs., 125 bls.; American Express Co., *Hamburg,* Hamburg, 19 cs.; W. Bersch, *Hamburg,* Hamburg, 4 bls.

RAGS, BAGGINGS, ETC.

Castle & Overton, Inc., Paraguayo, Buenos Ayres, 100 bls. dark cottons; Castle & Overton, Inc., *Paraguayo.,* Buenos Ayres, 320 bls. bagging; Loumar Textile By Products, *Pr. Roosevelt,* Hamburg, 73 bls. bagging; Chase National Bank, *Pennland,* Antwerp, 118 bls. bagging; Irving Trust Co., *Pennland,* Antwerp, 146 bls. jute waste; Manufacturers Trust Co., *Pennland,* Antwerp, 60 bls. flax waste; E. J. Keller Co., Inc., *Pennland,* ———, 235 bls. bagging; G. M. Graves Co., *Caledonia,* Glasgow, 64 bls. bagging; Darmstadt Scott & Courtney, *Caledonia,* Glasgow, 47 bls. paper stock; C. Comiter Co., *Yahiko Maru,* Kobe, 135 bls. cotton waste; Mitsui & Co. Ltd., *Yahiko Maru,* Yokohama, 125 bls. rags, ———, *American Banker,* London, 127 bls. rags, 25 bls. thread waste; J. Cohen & Son Co., Inc., *Andania,* Liverpool, 16 bls. rags; E. Shapiro & Son, *Kirishima Maru,* Kobe, 200 bls. cotton waste; The Barrett Co., *Alaunia, London,* 168 bls. rags; R. Blank, *City of Fairbury,* Copenhagen, 73 bls. rags; Brandwein Ma-



SUPER CALENDERS
FRICTION CALENDERS—EMBOSSING CALENDERS
COTTON & PAPER ROLLS—NEW & REFILLED

The Textile-Finishing Machinery Co.
New York Office
50 Church St.
Southern Office
Johnston Bldg., Charlotte, N. C.
Providence, R. I.

WOOD PULP
AGENTS

PRICE & PIERCE, Ltd.,

60 EAST 42nd ST.
NEW YORK

West Virginia Pulp and Paper Company

230 Park Ave.
New York

35 East Wacker Drive
Chicago

503 Market St., San Francisco, Cal.
Public Ledger Building, Philadelphia, Pa.

Manufacturers of

ENGLISH FINISH SUPERCALENDERED
MACHINE FINISHED BOOK
and LITHOGRAPHIC PAPERS

Offset, Envelope, Bond, Writing, Mimeograph, Ledger, Cover and Music Papers, Index Bristol, Post Card and Label Papers

HIGH GRADE COATED BOOK

. . . .

KRAFT WRAPPING AND KRAFT ENVELOPE.
KRAFT CYLINDER BOARD.
BLEACHED SULPHITE AND SODA PULP.
BLEACHED AND UNBLEACHED KRAFT PULP.

MILLS:

Mechanicsville, New York
Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Casa, West Virginia

SWW
100 YEARS AGO
A century ago the first Simonds - Worden - White product was offered for sale. Today the S.W.W. line enjoys a world-wide reputation. • Mill men, investigate S.W.W. standard and special patterned bed plates and beater bars. • Also paper trimming and chipper knives and Dayton abrasive wheels.

SIMONDS WORDEN WHITE CO.
OFFICE
DAYTON, OHIO
SWW
SWW
Factories at DAYTON - BUFFALO - CLEVELAND - BELOIT

zur Co., *Nanman Maru,* Shanghai, 125 bls. cotton waste; Royal Manfg. Co., *Nanman Maru,* Shanghai, 210 bls. cotton waste; C. Comiter Co., *Nanman Maru,* Shanghai, 75 bls. rags; W. Steck & Co., *Nanman Maru,* Shanghai, 100 bls. rags.; New England Waste Co., *Nanman Maru,* Kobe, 200 bls. cotton waste; Darmstadt Scott & Courtney, *Nanman Maru,* Kobe, 40 bls. rags; E. J. Keller Co., Inc., *Nanman Maru,* ———, 150 bls. cotton waste; E. J. Keller Co., Inc., *Beemsterdyk,* ———, 34 bls. paper stock; Great Eastern Packing & Paperstock Corp., *Beemsterdyk,* Rotterdam, 80 bls. bagging; National City Bank, *Beemsterdyk,* Rotterdam, 41 bls. rags; O'Brien Padawer Co., *Beemsterdyk,* Rotterdam, 74 bls. cotton waste; D. Benedetto, Inc., *Aakre,* Genoa, 152 bls. rags; Van Oppen & Co., *Hamburg,* Hamburg, 128 bls. rags; E. J. Keller Co., Inc., *Sanyo Maru,* ———, 50 bls. rags; E. J. Keller Co., Inc., *Exeter,* ———, 50 bls. bagging, 149 bls. rags.

HIDE CUTTINGS

———, *E. Francqui,* Antwerp, 347 bls.; ———, *Pennland,* Antwerp, 113 bls.

OLD ROPE

Chase National Bank, *E. Francqui,* Antwerp, 62 coils; Chase National Bank, *American Banker,* London, 48 coils; Banco Coml Italiane Trust Co., *Caledonia,* Glasgow, 57 coils; Banco Coml Italiane Trust Co., *Beemsterdyk,* Rotterdam, 63 coils; W. Steck & Co., *Beemsterdyk,* Rotterdam, 93 coils.

CASEIN

———, *Berengaria,* Southampton, 200 bags; ———, *Hamburg,* Hamburg, 134 bags.

CHINA CLAY

J. Dixon Crucible Co., *Hamburg,* Hamburg, 1400 bags.

WOOD PULP

J. Andersen & Co., *Pr. Roosevelt,* Hamburg, 1008 bls. sulphite 202 tons; Price & Pierce, Ltd., *Drottningholm,* Gothenburg, 325 bls. unbleached sulphite; Pulp Specialties, Inc., *Drottningholm,* Gothenburg, 165 bls. sulphate; Johaneson Wales & Sparre, Inc., *Drottningholm,* Gothenburg, 100 bls. sulphate; D. M. Hicks, Inc., *Drottningholm,* Gothenburg, 240 bls. chemical pulp; M. Sone, *Drottningholm,* Gothenburg, 250 bls. wood pulp; J. Andersen & Co., *Manhattan,* Hamburg, 252 bls. sulphite 50 tons; Castle & Overton, Inc., *Hamburg,* Hamburg, 250 bls. wood pulp.

WOOD PULP BOARDS

Absorbo Beer Pad Co., Inc., *Pr. Roosevelt,* Hamburg, 250 bls.; Flexideal Dry Mat Co., *Pr. Roosevelt,* Hamburg, 82 cs.; Flexideal Dry Mat Co., *Hamburg,* Hamburg, 70 bls.; ———, *Hamburg,* Hamburg, 250 bls.; H. Fuchs & Son, *Drottningholm,* Gothenburg, 199 crates; Jay Madden Corp., *City of Fairbury,* Hango, 148 rolls.

PORTLAND IMPORTS

WEEK ENDING MARCH 20, 1937

Gottesman & Co., Inc., *Svaneholm,* Sweden, 2399 bls. wood pulp; Gottesman & Co., Inc., *Stureholm,* Sweden, 4100 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING MARCH 20, 1937

———, *Beemsterdyk,* Rotterdam, 197 bls. wood pulp boards; Price & Pierce, Ltd., *Etna,* ———, 900 bls. bleached sulphite; E. J. Keller Co., Inc., *Black Hawk,* ———, 74 bls. bagging.

PHILADELPHIA IMPORTS

WEEK ENDING MARCH 20, 1937

Castle & Overton, Inc., *Paraguayo,* Buenos Ayres, 180 bls. paper stock; D. Benedetto, Inc., *Cypria,* Marseilles, 43 bls. rags; True & McClelland, *Cypria,* Marseilles, 42 bls. rags; A. Lamourelle, *Exermont,* Tunis, 122 bls. rags; J. T. Flannery, *Exermont,* Casablanca, 274 bls. rags; Neidich Process Co., *City of Fairbury,* Hango, 45 bbls. paper; J. W. Hampton, Jr., & Co., *City of Fairbury,* Hango, 350 rolls newsprint; Lagerloef Trading Co., *City of Fairbury,* Hango, 1090 bls. sulphate 186 tons; Lagerloef Trading Co., *City of Fairbury,* Hango, 230 bls. sulphite 39 tons; Castle & Overton, Inc., *Argentino,* Buenos Ayres, 368 bls. paper stock; Castle & Overton, Inc., *Argentino,* Buenos Ayres, 55 bls. new cuttings; Castle & Overton, Inc., *Beemsterdyk,* Rotterdam, 94 bls. rags; E. J. Keller Co., Inc., *Beemsterdyk,* ———, 444 bls. rags; Gottesman & Co., Inc., *Bochum,* Sweden, 2500 bls. wood pulp.

BALTIMORE IMPORTS

WEEK ENDING MARCH 20, 1937

Jay Madden Corp., *City of Fairbury,* Hango, 165 bls. wood pulp boards 25 tons; Lagerloef Trading Co., *City of Fairbury,* Hango, 360 bls. mechanical pulp 72 tons; Jay Madden Corp., *City of Fairbury,* Hango, 553 rolls newsprint; Castle & Overton, Inc., *City of Fairbury,* Hango, 1864 bls. sulphite 372 tons; Lagerloef Trading Co., *City of Fairbury,* Hango, 4742 bls. sulphate 857 tons; Lagerloef Trading Co., *City of Fairbury,* Hango, 3947 bls. sulphite 750 tons; Wilkinson Bros. & Co., Inc., *City of Fairbury,* Hango, 226 rolls newsprint; Philadelphia National Bank, *Beemsterdyk,* Rotterdam, 293 bls. bagging; Castle & Overton, Inc., *Beemsterdyk,* Rotterdam, 604 bls. wood pulp; M. M. Morris, *Beemsterdyk,* Rotterdam, 80 bls. wood pulp boards; M. Sone, *City of Hamburg,* Hamburg, 164 bls. wood pulp; Price & Pierce, Ltd., *Rio Verde,* ———, 6336 bls. unbleached sulphite; Price & Pierce, Ltd., *Rio Verde,* ——— —5,424 bls. unbleached sulphate; Price & Pierce, Ltd., *Rio Verde,* ———, 1500 bls. unbleached mechanical pulp; Price & Pierce, Ltd., *Rydboholm,* ———, 2500 bls. unbleached sulphite.

H. R. White With Palmieri-Kramer

Palmieri-Kramer Corporation, 274-276 Flushing Avenue, Brooklyn, N. Y., dealers and packers of all grades of paper stock and specialties, have added to their staff Harold R. White, son-in-law of Dominick Palmieri, who with Milton Kramer, another son-in-law, will represent the concern as outside contact men, under the supervision of Mr. Palmieri, general manager of the concern.

Southern Extract Co. Expands

[FROM OUR REGULAR CORRESPONDENT]

KNOXVILLE, Tenn., March 22, 1937—A steam-driven generating plant costing $75,000 has been built as an addition to the plant of the Southern Extract Company in Lonsdale, Tenn., it is announced by Guy A. Garstang, secretary. The new unit increases capacity to 2,800 h.p. A new drying unit to dry paper rolls has been in use for a month. The company manufactures paper board used in corrugated boxes.

Foxboro Moves Atlanta Office

The Foxboro Company, makers of industrial precision instruments and controllers, have just announced the change of address of their Atlanta office. This change became effective March 1.

The new office is now located at: Room 715, 101 Marietta street building, Atlanta.

The new quarters, which are much larger than the old ones, were necessitated by the rapid growth of business in the Southern district.

Use

HELMERCO REDS

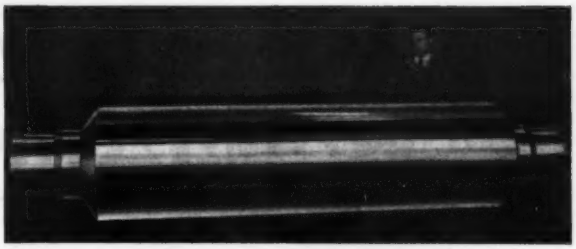
For Cover Papers

Tests and research prove that Helmerco Reds are outstanding in the manufacture of cover papers. In addition to instant dispersion, Helmerco Reds are extremely fast to light, and produce cover stock in excellent brilliant shades.

Ask for working samples today.

Heller & Merz

DIVISION OF THE CALCO CHEMICAL CO., INC.
90 West Street, New York, N. Y.
A DIVISION OF AMERICAN CYANAMID COMPANY
BOSTON—35 Hartford St. • CHICAGO—146 W. Kinzie St.
SPRINGFIELD, MASS.—40 Albert St.
PHILADELPHIA—401 No. Broad St.
Factories: BOUND BROOK, N. J. and NEWARK, N. J.



FARRELOY ROLLS

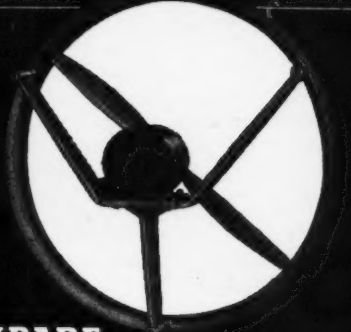
For applications like water finish papers where operating conditions are especially severe Farreloy Rolls offer definite operating advantages and economies.

These alloy rolls are 7 to 10 points harder than chilled iron, they offer greater resistance to wear, do not rust or pit so quickly and retain their shape and finish longer.

Fewer interruptions to production . . . . . less frequent re-grinding . . . . . less maintenance expense . . . . . are some of the economies of Farreloy Rolls that reduce operating costs.

FARREL-BIRMINGHAM COMPANY, INC.
50 State St., Ansonia, Conn.

DEMAND PROOF!



COMPARE
PROPELLAIR FANS
with other fans of equal size in AIR DELIVERY, CURRENT CONSUMPTION and OPERATING EFFICIENCY

PROPELLAIR, INC. SPRINGFIELD, OHIO

IF IT'S A JOB OF MOVING AIR THERE'S A
PROPELLAIR TO DO IT

Stearns TANKS
Since 1849

CYPRESS
REDWOOD
HARD PINE
CEDAR
FIR
•*ALL TYPES*
Knock Down or Set Up

LEAD LINED TANKS *a Specialty*

Several Million Feet Lumber in Stock. Will Furnish Lumber Rough, Planed, or Manufactured Into Tanks.

Let Us Quote on Your Specifications

The A.T. STEARNS LUMBER CO.
TEL. TALbot 1040 Neponset Boston, Mass.

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, March 24, 1937.

The position of the local paper market is growing stronger. Demand for the various standard grades of paper is better. Offerings continue limited and some mills are still having difficulties in filling orders for immediate delivery. Quotations are steady to firm, in most instances.

With business in the newsprint paper market brisk, the announcement of the International Paper Company of an advance in price to $50 per ton for the first six months of 1938 is being received with great favor by other interests in the industry. Manufacturing operations are proceeding in excellent volume.

The fine paper market is exhibiting a strong undertone. Demand for writing, cover, bond and ledger papers is holding up well. Prices continue firm. Tissues are going forward at a steady pace for the season. The coarse paper market is quite firm. Paper board grades are displaying strength.

Mechanical Pulp

Conditions in the ground wood pulp market are favorable. Production in North America and abroad is keyed to consumption, as far as possible, and the statistical position of the industry is considered sound. There are no undue accumulations at the pulp mills. Prices are firm.

Chemical Pulp

The chemical pulp market continues strong. Offerings of imported and domestic grades for immediate delivery are decidedly scarce at present. Prime bleached sulphite is still quoted at from $2.90 to $4; easy bleaching sulphite at from $3.25 to $3.75 and strong unbleached sulphite at from $3.25 to $3.50.

Old Rope and Bagging

Due to scarcity of offerings the old rope market is much firmer than of late. Both foreign and domestic old manila rope is now quoted at from $5 to $5.25, f.o.b. New York. The bagging market is somewhat softer and there is some talk around of lower quotations in the near future.

Rags

The domestic rag market is fairly steady for the season. Demand for new and old cotton rags is well sustained. No. 1 white shirt cuttings are arousing interest for both home and foreign account. Roofing grades are seasonally busy. No radical changes have transpired in the foreign rag market.

Waste Paper

Steadiness prevails in the local paper stock market. Board mill demand for the lower grades is fairly heavy and prices of strictly folded news and No. 1 mixed paper are firmer than of late. The higher grades of waste paper pursue the even tenor of their ways with prices generally unchanged.

Twine

The local twine market is in a better position. Demand for the various varieties is most insistent. Supplies are moving into consumption regularly. Quotations on most soft fiber twines have advanced again. Hard fiber twines continue steady.

Reference Standards Available for Calibration of Viscosity Tubes

The Hartman-Leddon Company, Philadelphia, has recently made available four mineral oil reference standards for the calibration of viscosity tubes used in the TAPPI standard method for determining the cuprammonium viscosity of pulps (Method T-206 m-35). These reference standards comprise four oils of approximately 20, 50, 100 and 200 centipoises, with a statement of the actual measurement within a tolerance of error of 0.5 centipoise.

The availability of these reference standards, covering a viscosity range of 20 to 100 centipoises and beyond, should be of interest to all those who use the TAPPI standard viscosity method for control and research testing. These oils are reasonably priced and should prove superior to the usual glycerine-water solutions heretofore used as reference standards.

I. P. I. Acquires Continental

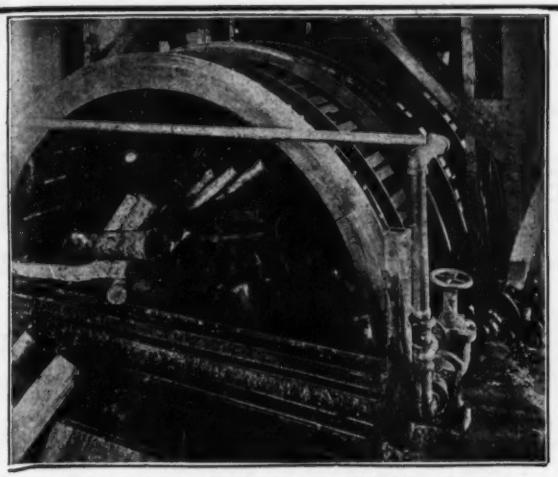
The International Printing Ink Corporation has acquired control of the Continuental Color Corporation, Cleveland, Ohio, and will operate this firm as an I.P.I. subsidiary. No changes in personnel are contemplated.

The Continental company, headed by Fred George, has developed a process for coloring all types of package papers, including "liner board". It is said to be especially significant in the corrugated shipping container field. The process employs radically new formulations, and it is understood that I.P.I. will actively promote its use through the sale of the necessary color materials and equipment for applying the colors.

Since this method makes it economical to color fiber board for advertising or decorative purposes, the manufacturers claim that what was formerly waste space on shipping containers can now be profitably utilized.

Foote Bros. Staff Changes

Foote Bros. Gear and Machine Corporation announce the following changes in territorial sales personnel: E. G. Akridge, who has been handling the territory on the North Side of Chicago is appointed direct factory representative in the Detroit territory succeeding Thomas Lord, resigned. F. A. Emmons, Jr., takes over the territory vacated by Mr. Akridge and Harry Harrison has been appointed sales engineer in the Central territory in Chicago.



THE U-BAR-WELDED BARKING DRUM

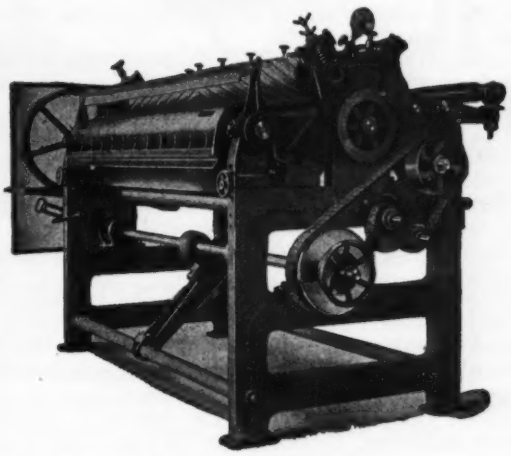
Higher capacity than any other type of drum. 2—12' x 45' U-Bar Drums bark all the wood for a daily production of 650 tons per day. Less upkeep than any other type of drum, no bolts to tighten nor rivets to replace. Our drum is guaranteed against repairs for two years. We have sold 28 welded drums during the last 3 years, all repeat orders.

FIBRE MAKING PROCESSES, INC.

Tribune Tower, Chicago, Illinois

MODEL 28

ROLLER BEARING CUTTER



HAMBLET MACHINE CO.

LAWRENCE, MASS.

MAKERS OF

SINGLE, DUPLEX AND DIAGONAL PAPER CUTTERS. CUTTER KNIVES, PATENT TOP SLITTERS.

Our Specialty is Jordan Fillings

We make and stock them for every known trade name and size Jordan.

A type Filling for every kind of stock.

Trade Mark

POSITIVE

Reg. U. S. Pat. Off.

Your inquiries and orders will have prompt attention

THE BAHR BROTHERS MFG. CO.

Marion, Indiana, U.S.A.

The ORIGINAL self-dispersing Pigment Blues for tinting:

NYCO

LIQUID BLUES

and

SUPER BLUES (Dry)

OUTSTANDING—but only one series of the NYCO complete line of selected colors for the Paper Manufacturer.

● Consult NYCO when you have a color problem ● Our laboratory facilities are at your disposal ●

NEW YORK COLOR AND CHEMICAL COMPANY

Div. of American Dyewood Co.

Main Office and Works:

BELLEVILLE, N. J.

Branches:

BOSTON CHICAGO
PHILADELPHIA HOLYOKE, MASS.

Agencies:

KALAMAZOO, MICH., MIDDLETOWN, O.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, March 24, 1937.

BLANC FIXE—The position of the blanc fixe market is practically unchanged. Prices are holding to schedule. The pulp is quoted at from $42.50 to $45 per ton, in bulk; while the powder is selling at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—Conditions in the bleaching powder market are fairly satisfactory. Demand from the paper mills is moderately active for the season. Prices are steady. Bleaching powder is quoted at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The casein market is fairly active. Domestic standard ground is quoted at 17½ and finely ground at 18 cents; while Argentine standard ground is selling at 18½ and finely ground at 19 cents per pound, all in bags, car lot quantities.

CAUSTIC SODA—Most of the business transacted in the caustic soda market is routine. Prices remain unchanged. Solid caustic soda is quoted at from $2.55 to $2.60; while the flake and ground are selling at from $2.95 to $3 per 100 pounds, in drums, at works.

CHINA CLAY—The china clay market is exhibiting a strong undertone. Demand from the paper mills is brisk. Imported china clay is quoted at from $15 to $21 per ton, ship side; while domestic paper making clay is selling at from $6.50 to $12 per ton, at works.

CHLORINE—Steadiness prevails in the chlorine market. Demand from the paper mills is fairly heavy. Contract shipments are moving freely. Prices are holding to schedule. Chlorine is selling at from $2.15 to $2.25 per 100 pounds, in tank cars, at works.

ROSIN—The rosin market is stronger. Paper making gum rosin is now quoted at $9.55 and wood rosin at $9.45 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $4.28 per 100 pounds, in tank cars, at works.

SALT CAKE—Paper mill demand for salt cake is excellent. Prices continue firm. Sale cake is quoted at from $12 to $13; chrome salt cake at from $11 to $12 per ton, at works; while imported salt cake is selling at from $12 to $13 per ton, ship side.

SODA ASH—The soda ash market is displaying strength. Demand from the paper mills is well sustained. Prices are holding to schedule. Quotations on soda ash, in car lots, at works, per 100 pounds, are still as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH—Business in the starch market is normal for the time of year. Shipments against contract are moving freely. Prices are steady. Special paper making starch is quoted at $4 per 100 pounds, in bags; and at $4.27 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA—The sulphate of alumina market is holding up well. Contract shipments are moving regularly. Commercial grades are still quoted at from $1.35 to $1.60; while iron free is selling at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The sulphur market is steady. Yearly contracts are quoted at $18 per long ton, on orders of 1,000 tons, or over, and $20 on smaller quantities. On spot and near by car loads the quotation is $21 per ton. All quotations are in car lots, at works.

TALC—Supplies of talc are moving into consumption in fairly good volume. Prices are holding to schedule. Domestic talc is quoted at from $15 to $18 per ton, at eastern mines; while imported talc is selling at from $23 to $30 per ton, on dock.

Market Quotations

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.29 @	.30
75% Rag	.22 @	.23
65% Rag	.19 @	.20
50% Rag	.15½ @	.16½
25% Rag	.13 @	.14

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	8.00 @	9.00
No. 2 Sulphite	7.00 @	8.00
No. 3 Sulphite	6.75 @	7.75
No. 4 Sulphite	6.50 @	7.50
Book, B Grade, Cased (f.o.b. mill less carload freight allowed)		
S. & S. C.	6.00 @	—
S. & S. C. Litho.	6.25 @	—
M. F.	5.75 @	—
No. 4 Coated and Enamel	7.00 @	—
No. 4 Coated Litho	7.00 @	—
Tissues—Per Ream—		
White No. 1	.95 @	—
White No. 1 M. G.	.92½ @	—
White No. 1½	.67½ @	—
White No. 2	.62½ @	—
Anti-arnish M. G.	.75 @	—
Colored	.87½ @	—
Kraft	.75 @	—
Manila	.62½ @	—
Unbleached Toilet.	2.60 @	3.30
Bleached Toilet	3.94 @	5.26
Paper Towels—		
Unbleached	2.10 @	3.35
Bleached	3.30 @	3.70
Manila—		
No. 1 Jute	9.00 @	9.25
No. 2 Jute	7.75 @	8.50
No. 1 Wood	4.00 @	5.25
No. 2 Wood	3.50 @	4.00
Fibre Papers—		
No. 1 Fibre	4.25 @	5.50
No. 2 Fibre	4.00 @	4.75

(Delivered New York)

News, per ton—		
Roll, contract	42.50 @	—
Sheets	47.50 @	—
Kraft—		
No. 1 Northern	5.25 @	5.75
Standard	5.00 @	—
Southern	5.00 @	—
Glazed	4.50 @	—
Striped	4.75 @	—
Boards, per ton—		
News	47.50	@50.00
Chip	45.00	@47.50
Sgl. Mla. Ll. Chip.	55.00	@60.00
Jute Lined Chip	55.00	@60.00
Kraft Liners	67.50	@70.00
White Pat. Coated.	67.50	@70.00
Binders Boards	70.00	@75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—		
Moist	33.00	@35.00
Dry	33.00	@35.00
(Delivered)		
No. 1 Domestic and Canadian	33.00	@36.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—		
Prime Bleached Sulphite	2.90	@ 4.00
Prime Qualities—		
Easy-Bleaching Sulphite	3.25	@ 3.75
Strong Unbleached Sulphite	3.25	@ 3.50
(On Dock, Atlantic Ports)		
Kraft Bleached	3.50 @	3.75
Kraft Light & Strong	2.35 @	3.25
Kraft No. 1	2.25 @	3.10
Kraft No. 2	2.25 @	2.50
(F.o.b. Pulp Mill)		
Kraft Domestic	2.50	@ 2.85
(Delivered)		
Soda Bleached	2.90 @	—

Add 60 cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—		
New White, No. 1.	9.00	@ 9.25
Silesias No. 1	6.75	@ 7.00
New Unbleached	9.25	@ 9.50
Blue Overall	7.00	@ 7.25
Fancy	3.50	@ 3.75
Washables	2.25	@ 2.50
Mixed Khaki Cuttings	3.50	@ 3.75
O. D. Khaki Cuttings	4.25	@ 4.50

Old Rags

White, No. 1—		
Repacked	3.50	@ 3.75
Miscellaneous	3.00	@ 3.25
White, No. 2—		
Repacked	2.50	@ 2.75
Miscellaneous	2.00	@ 2.25
Thirds and Blues—		
Repacked	2.00	@ 2.25
Miscellaneous	1.90	@ 2.00
Roofing Rags—		
No. 1	Nominal	
No. 2	1.85	@ 1.90
No. 3 (bagging)	1.50	@ 1.60
No. 4	1.50	@ 1.60
No. 5A	1.40	@ 1.50

Foreign Rags

New Rags

New Dark Cuttings	2.25	@ 2.50
New Mixed Cuttings	2.00	@ 2.25
New Light Silesias	5.50	@ 5.75
Light Flannelettes	5.50	@ 5.75
New White Cuttings	7.00	@ 7.50
New Light Oxfords	4.00	@ 4.50
New Light Prints	3.00	@ 3.25

Old Rags

No. 1 White Linens	7.50	@ 8.00
No. 2 White Linens	6.50	@ 7.00
No. 3 White Linens	4.50	@ 5.00
No. 4 White Linens	2.25	@ 2.50
No. 1 White Cotton	4.25	@ 4.75
No. 2 White Cotton	3.25	@ 3.75
No. 3 White Cotton	2.50	@ 2.75
No. 4 White Cotton	1.90	@ 2.15
Extra Light Prints	2.00	@ 2.25
Ord. Light Prints	1.75	@ 1.85
Med. Light Prints	1.55	@ 1.65
Dutch Blue Cottons	2.25	@ 2.50
French Blue Linens	3.50	@ 4.00
German Blue Linens	2.50	@ 2.75
German Blue Cottons	2.00	@ 2.25
Checks and Blues	2.00	@ 2.25
Linsey Garments	2.25	@ 2.35
Dark Cottons	2.15	@ 2.25
Old Shopperies	1.75	@ 2.00
New Shopperies	1.75	@ 2.00
French Blues	2.25	@ 2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—		
Foreign	2.25	@ 2.35
Domestic	2.15	@ 2.25
Wool Tares, light	1.75	@ 1.85
Wool Tares, heavy	2.20	@ 2.35
Bright Bagging	1.70	@ 1.75
Manila Rope—		
Foreign	5.00	@ 5.25
Domestic	5.00	@ 5.25
Jute Strings	2.75	@ 3.00
Sisal Strings	2.60	@ 2.75
Mixed Strings	Nominal	

Old Waste Papers

(F. o. b. New York)

Shavings—		
White Envelope Cuttings	3.20	@ 3.30
Ordinary Hard White No. 1	2.50	@ 2.60
Hard White No. 2	2.20	@ 2.30
Soft White No. 1	2.00	@ 2.10
Flat Stock—		
Stitchless	1.25	@ 1.30
Over issue Mag	1.25	@ 1.30
Solid Flat Book	1.15	@ 1.25
Crumbled No. 1	.95	@ 1.05
Ledger Stock	1.30	@ 1.35
New B. B. Chips	.55	@ .60
Manila—		
New Env. Cut	2.15	@ 2.25
New Cuttings	1.60	@ 1.70
Old Kraft Machine— Compressed bales	1.70	@ 1.80
News—		
No. 1 White News	1.40	@ 1.50
Strictly Overissue	.70	@ .85
Strictly Folded	.70	@ .80
No. 1 Mixed Paper	.65	@ .70

Sulphur

A FIRST REQUISITE

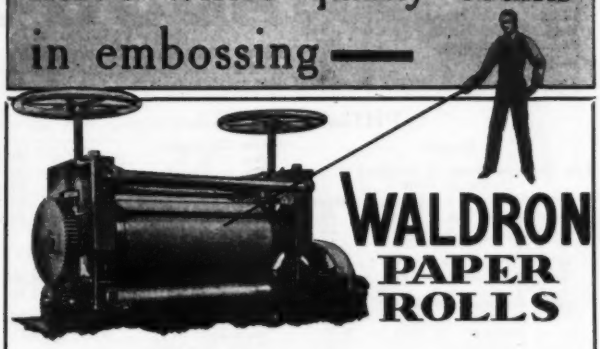
in

Paper Making

Large Production
Ample Reserves
Prompt Deliveries
Purity 99½%

TEXAS GULF SULPHUR CO.
75 E. 45th Street New York City
Mines: Gulf, Newgulf and Long Point, Texas

here's where quality counts in embossing—



WALDRON PAPER ROLLS

are the finest that skill and experience can construct. Yet you pay no premium for their extra QUALITY nor for the greater service they assure. If you have tried the rest—now test the best. Layer after layer of finely conditioned paper scientifically pressed into a smoother firm roll, fitted with carefully proportioned steel shafts and precision machined to a true, even surface. Try Waldron on your next paper roll purchase.

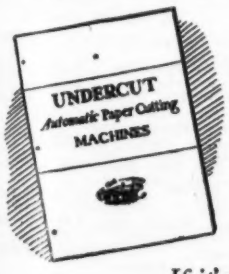
JOHN WALDRON CORPORATION
Main Office and Works: NEW BRUNSWICK, N. J.
Chicago New York Portland, Ore.

RAG CUTTERS

TAYLOR, STILES & COMPANY
TRADE MARK
GIANT
REG. U.S. PAT. OFF.
RIEGELSVILLE, N.J. U.S.A.

CHOPPERS — SHREDDERS

★ *Is your FINISHING ROOM truly SAFE?*



SEND for this bulletin. Read how the Undercut principle, pioneered by S & W, is your one best safeguard against accidents—also why it is the most accurate cutter on the market today. Request Bulletin T-12.

If it's UNDERCUT, *it's* S & W

The SMITH & WINCHESTER MFG. Co.
SOUTH WINDHAM, CONNECTICUT 3935

THE DRAPER FELTS

All kinds and styles of Felts for all kinds and styles of Papers.

Write us about your Felt problems and let us help you reduce your Felt Costs—we will call anywhere at any time.

DRAPER BROS. COMPANY
CANTON, MASS.

Woolen manufacturers since 1856

Twines

(F. o. b. Mill)

(Soft Fibre)

Coarse Polished—			
India	.15¼	@	.17¼
Belg. White Hemp	.16¼	@	.19¼
India Compress	.15¼	@	.16¼
Fine Polished—			
Fine India	.21	@	.23
Unpolished—			
Box	.11¼	@	.11¾
Paper Makers	.11	@	.13
Tube Rope	.12	@	.14¾
Wall Paper	.13	@	.13¾
Wrapping	.16	@	.20
Soft Fiber Rope	.14¼	@	.14¾

(Hard Fibre)

Bond	.13½	@	.22
Anchor	.13	@	.14½
Manila	.21	@	.28

PHILADELPHIA

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, M.F.	5.00	@	—
Book, S. S. & C.	5.25	@	—
Book, Coated	6.75	@	—
Coated Lithograph	6.75	@	—
No. 1 Jute Manila	10.50	@	—
Manila Sul., No. 1	6.75	@	—
Manila No. 2	4.25	@	—
No. 1 Kraft	6.00	@	—
Southern Kraft	5.00	@	—
News Print Rolls	42.50	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Carload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.08	@	.08½
New White, No. 2.	.04½	@	.05
Light Silesias	.05½	@	—
Silesias, No. 1	.04½	@	.05
Black Silesias, soft.	.03½	@	.04
New Unbleached	.06	@	—
Washable, No. 1	.02	@	.02½
Blue Overall	.07	@	.07½
Cottons—According to grades—			
Washable, No. 2	.02½	@	.04½
New Blue	.02	@	.02½
Fancy	.03	@	—
New Black Soft	.04	@	.04½
New Light Seconds	.03½	@	.04
New Dark Seconds	2.00	@	2.25
Khaki Cuttings—			
No. 1 O. D.	.04	@	.04½
No. 2 Mixed	.03½	@	.04
Corduroy	.02	@	.02¼
New Canvas	.04	@	.04½
New Black Mixed	.02	@	.02¼

Domestic Rags (Old)

White No. 1—			
Repacked	4.00	@	4.50
Miscellaneous	3.00	@	3.50
Thirds and Blues—			
Miscellaneous	2.00	@	2.25
Repacked	2.50	@	2.75
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1	2.20	@	2.25
Domestic No. 1	2.10	@	2.20
Domestic No. 2	1.90	@	2.00
Roofing bagging	1.75	@	1.85

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	2.00	@	—
Domestic	2.25	@	—
Manila Rope	2.75	@	—
Sisal Rope	2.25	@	2.35
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	2.25	@	2.50
No. 2	1.00	@	1.10
Wool Tares, heavy	3.25	@	3.50
Mixed Strings	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.50	@	2.75

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.40	@	2.50
No. 2 Hard White	2.20	@	2.25
No. 1 Soft White	2.00	@	2.10
No. 2 Soft White	1.40	@	1.45
No. 1 Mixed	—	@	.85
Solid Ledger Stock	—	@	1.75
Ledger Stock, white	1.60	@	1.65
Ledger Stock, colored	1.20	@	1.25
No. 1 Books, heavy	1.20	@	1.25
Manila Cuttings	1.80	@	1.90
Print Manila	.60	@	.65
Container Manila	.50	@	.55
Kraft Paper	—	@	1.40
No. 1 Mixed Paper	.50	@	.55
Straw Board Chip	.50	@	—
Binders Board Chip	.50	@	—
Corrugated Board	.65	@	.70
Overissue News	.75	@	.80
Old Newspapers	.60	@	.65

BOSTON

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.65	8.65
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.25	7.25
No. 4 Sulphite	6.50	7.50

F.o.b. Mill

Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¾	@	.06¾
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.05¼	@	—
No. 2 Kraft	.05	@	—

(Delivered New England points)

Southern Kraft	.05	@	—
News Print Rolls	42.00	@	—
Straw Board, rolls	.009	—	@35.00
Filled News Board	47.50	@	50.00
Chip Board	45.00	@	47.50
Single Manila Lined Chip	55.00	@	60.00
Single White, Patent Coated News Board (Bender)	67.50	@	75.00
Wood Pulp Board	70.00	@	75.00
Binder Boards (Standard Grade)	70.00	@	75.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.20	@	2.35
No. 1 Soft White	1.85	@	2.15
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	1.35	@	—
No. 1 Books, light	.65	@	.75
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.60	@	1.70
Manila Env. Cuttings, extra quality	2.15	@	2.25
No. 1 Old Manila	.80	@	.85
White Blank News	1.25	@	1.30
No. 1 Kraft	1.90	@	2.00
Mixed Papers	.55	@	.60
Print Manila	.75	@	.85
Container Manilas	.27½	@	—
Old Newspapers	.60	@	.62½
Overissue News	.50	@	.65
Box Board Chips	.40	@	.45
Transmission Rope	2.00	@	2.25
Corrugated Boxes	.82½	@	—
Kraft corrugated boxes	1.50	@	1.60
Screening Wrappers	.60	@	.65

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	4.50	@	4.90
Domestic	3.00	@	3.30
Jute Rope	2.50	@	2.75
Soft Jute Strings	2.50	@	2.62½
Jute Carpet Threads	1.75	@	2.00
Gunny No. 1—			
Foreign	2.35	@	2.50
Domestic	2.10	@	2.20
Bleachery Burlap	4.25	@	4.50
Scrap Burlap—			
Foreign	2.15	@	2.25
Domestic	2.10	@	2.20
Scrap Sisal	2.50	@	2.60
Scrap Sisal for Shredding	2.75	@	2.90
Wool Tares, heavy	2.25	@	2.40
New Burlap Cuttings	2.85	@	3.00
Aust. Wool Pouches	2.90	@	3.00
Heavy Baling Bagging	2.40	@	2.75
Paper Mill Bagging	1.75	@	1.80
Bagging No. 2	1.70	@	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04	@	.04¼
New White No. 1	.09	@	.09¼
New White No. 2	.06¼	@	.07
Silesias No. 1	.07¾	@	.08
New Black Silesias	.04¼	@	.04½
Soft Unbleached	.09½	@	.09¾
Blue Cheviot	.07½	@	.07¾
Fancy	.03¾	@	.04
Washable	.03	@	.03¼
Cottons—According to grades—			
Blue Overalls	.07½	@	.07¾
New Black, soft	.04¼	@	.04¼
Khaki Cuttings	.04¾	@	.05
O. D. Khaki	.05	@	.05¼
Corduroy	.03¼	@	.03½
New Canvas	.07¾	@	.08¼
B.V.D. Cuttings	.08¼	@	.09

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.75	@	2.00
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	3.90	@	4.00
Roofing Stock—			
No. 1	1.70	@	1.80
No. 2	1.60	@	1.70
No. 3	1.30	@	1.35

Foreign Rags

(F. o. b. Boston)

Dark Cottons	2.15	@	2.25
New white shirt cuttings	6.75	@	7.50
Dutch Blues	3.00	@	3.15
New Checks and Blues	2.85	@	3.00
Old Fustians	2.85	@	3.00
Old Linsey Garments	2.65	@	2.90
New Silesias	6.50	@	7.00

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.12	@	.40
Water Marked Sulphite Bond	.06¾	@	.11
Sulphite Bond	.05½	@	.07¾
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¾
No. 2 M. F. Book	.05¼	@	.06¾
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¼	@	.05¾
No. 1 Fibre	.04¾	@	.05¾
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.03¾	@	.03¾
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03¾
Manila Tissue	.05¾	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News, per ton—			
Rolls, contract	42.00	@	—
Sheets, open	47.00	@	—
Boards, per ton—			
Plain Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent Coated	65.00	@	—
Container Lined—			
85 Test, per 1000 sq. ft.			1.70
100 Test, per 1000 sq. ft.			1.85

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings	1.70	@	2.00
No. 1 Hard White	1.40	@	1.65
No. 1 Soft White	1.25	@	1.50
Ledger & Writings	.60	@	.70
Solid Books	.50	@	.60
Blanks	1.00	@	1.05
Krafts	.80	@	.90
New Kraft Cuts	1.20	@	1.30
Manila Env. Cuts	1.25	@	1.30
Ex. No. 1 Manila	.90	@	1.00
Print Manila	.40	@	.50
Overissue News	.40	@	.45
Old Newspapers—			
No. 1 Folded News	.42½	@	.45
No. 1 Mixed Paper	.25	@	.30
Roofing Stocks—			
No. 1	30.00	@	—
No. 2	28.00	@	—

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	—
No. 1 Tints	.36½	@	—
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	.14½	@	—
No. 4 Tints	.15½	@	—
No. 5 Bond—White	.10¼	@	—
No. 5 Bond—Tints	.11¾	@	—
No. 5 Bond—Golden Rod	.12¾	@	—
No. 5 Ledger—White	.11¾	@	—
No. 5 Ledger—Tints	.12¾	@	—
No. 6 Bond—White	.10	@	—
No. 6 Bond—Tints	.10½	@	—
No. 6 Bond—Golden Rod	.12	@	—
No. 7 Bond—White	.08¼	@	—
No. 7 Bond—Tints	.08¾	@	—
No. 7 Bond—Golden Rod	.10¼	@	—
Book—			
No. 1 M. F.	6.50	@	6.75
No. 2 M. F.	6.25	@	6.50
No. 3 M. F.	5.00	@	5.35
No. 1 S. C.	7.00	@	7.50
No. 2 S. C.	6.50	@	7.00
No. 3 S. C.	5.50	@	6.00
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.75	@	—
White Wrap	3.50	@	—
"B" Manila	4.80	@	—
No. 1 Manila	5.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
Kraft, No. 2	5.40	@	—

(F. o. b. Cars Toronto)

News, per ton—			
Rolls, (contract)	Nominal		
Sheets	Nominal		

Pulp

Ground wood	29.00	@	30.00
Unbleached Sulphite	52.00	@	—
Book (Class 1)	64.00	@	—
Writing (Class 2)	65.00	@	—
Select (Class 3)	66.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.00	@	2.25
Soft White	1.60	@	1.90
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	1.00	@	—
Light and Crumpled Book Stock	.90	@	—
Ledgers and Writings	1.10	@	—
Manila—			
New Manila Cut	1.20	@	1.40
Printed Manilas	.55	@	—
Kraft	1.00	@	1.60
News and Soap—			
Strictly Overissue	.65	@	—
Strictly Folded	.65	@	—
No. 1 Mixed Paper	.55	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.09	@	.09¼
Fancy Shirt Cuttings	.03¼	@	.04